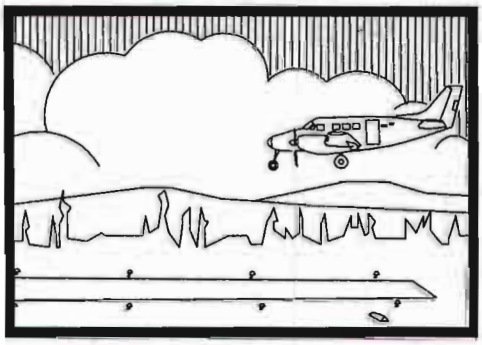
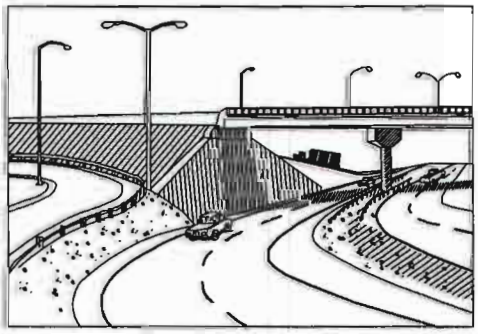
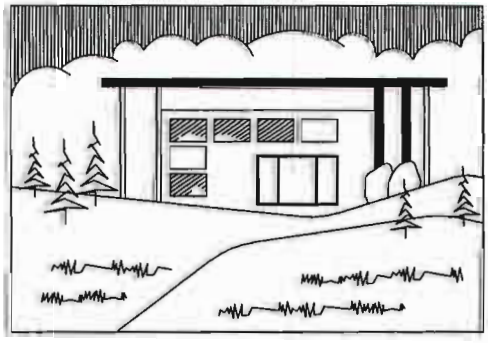
GEOTECHNICAL REPORT

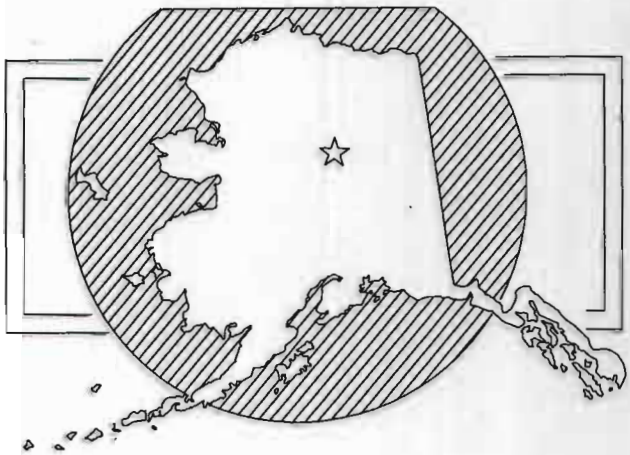
NOATAK AIRPORT
RELOCATION
STATE PROJECT NO. 61478







STATE OF ALASKA
Department of Transportation and Public Facilities



NORTHERN REGION
FEBRUARY 2008

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GEOTECHNICAL REPORT
NOATAK AIRPORT RELOCATION
STATE PROJECT NO. 61478
NORTHERN REGION

PREPARED BY:

JULIE ROWLAND
Engineering Geologist

REVIEWED BY:

STEVE MASTERMAN
Regional Geologist

APPROVED BY:

STATE OF ALASKA
49TH
LEO J. WOSTER
C.E. 7160

1-31-08

LEO J. WOSTER, P.E.
Materials Engineer

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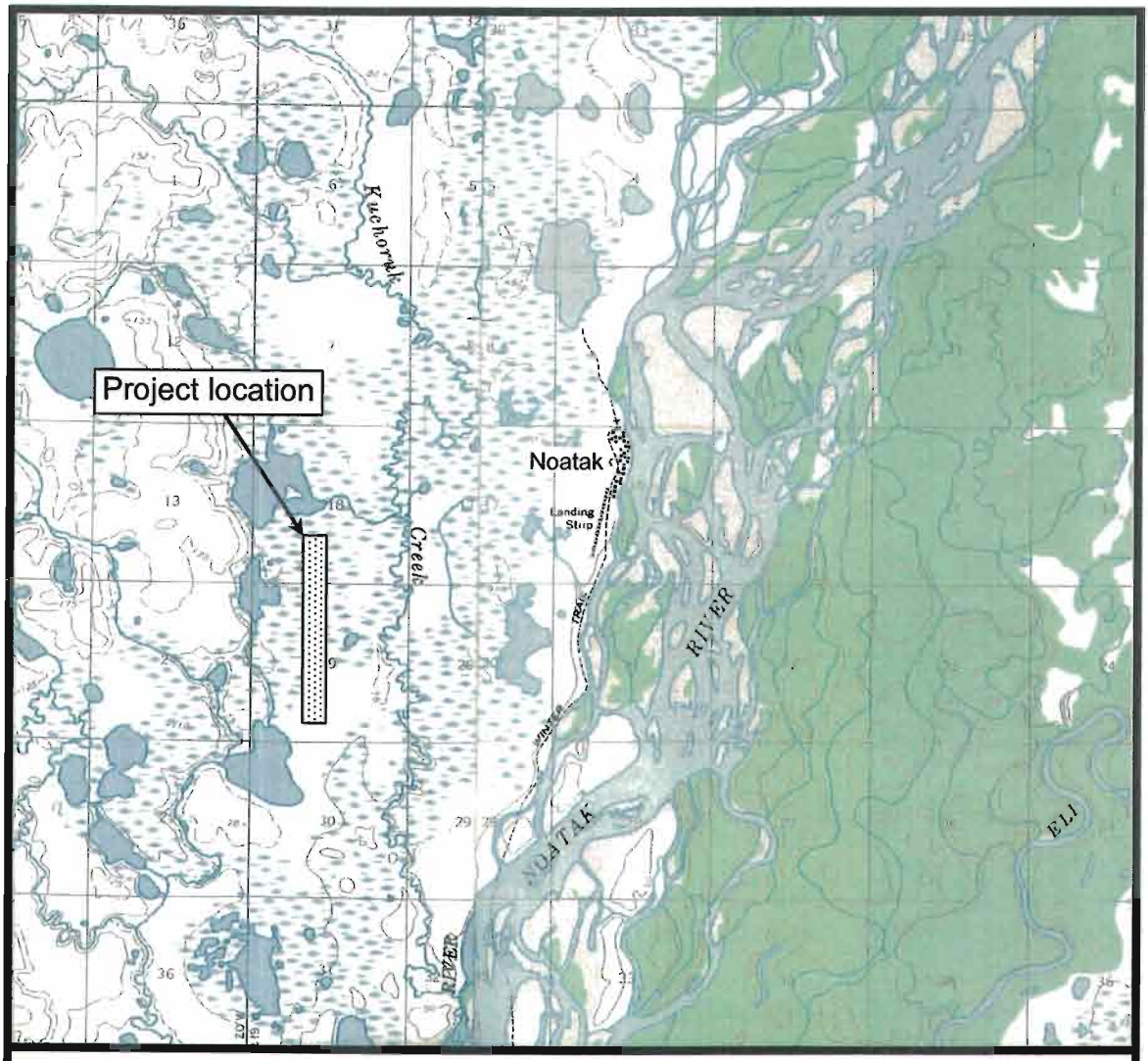

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State of Alaska
Department of Transportation
And Public Facilities

Noatak Airport Relocation
Vicinity Map

GEOTECHNICAL REPORT
NOATAK AIRPORT RELOCATION
STATE PROJECT NO. 61478
NORTHERN REGION

Summary

The Alaska Department of Transportation & Public Facilities (DOT&PF) proposes to relocate the airport in Noatak about 1.5 miles to the west. At the request of Project Manager Ryan Anderson, Northern Region Materials Section (NRMS) conducted subsurface investigations for three alternate runway alignments, an apron and taxiway, an access road, a proposed bridge, and a material site. At the time this report was written, the final airport location had not been determined.

Foundation soils throughout the proposed new airport site were fairly uniform, with permafrost in every test hole. The typical profile consisting of the following generalized sequence:

- 6 to 12-inch-thick organic mat;
- 6 to 12 inches of peat with ice-rich silt;
- brown to gray silt with organics and ice to depths of 15 to 22+ feet;
- 1 to 2 feet of gray silt with sand to fine sandy silt;
- underlain by gray silty sandy gravel to gravelly sand to depths drilled.
- We intercepted massive ice several feet thick in numerous holes, including the north end of runway alternative #3 and on the small hill east of runway alternative #1.

Thermal modeling results indicate that no thaw will occur below the centerline of a 14-foot-high embankment, or below the centerline of an 8-foot-high embankment with 4 inches of insulation placed either at the ground surface or at 2 feet above the ground surface within the embankment.

A comparison of embankments with 4H:1V fore slopes and 2H:1V fore slopes indicates that use of 2:1 fore slopes results in less thaw at the toe. For all embankment configurations, at least 4.5 feet of thaw will occur below the toe. Settlements on the order of 1 to 3 feet or more can be expected at the toe with this amount of thawing.

Introduction

This report documents physical site conditions, provides analyses and interpretation of anticipated site conditions for the project, and recommends design and construction criteria for the project. This report is intended to serve as a geotechnical guide during project design and construction.

This report presents the centerline and material site investigation findings. A separate Foundation Geology Report has been prepared with results of the bridge foundation investigation.

Erosion along the west bank of the Noatak River has encroached on the existing airport. The airport relocation project is proposed in anticipation of further erosion destroying the

current facility. Some erosion control measures have been attempted in the past, however, these have not halted erosion in the vicinity of the airport. Ice-rich silt (permafrost) along the 15- to 25-foot-high riverbank erodes easily when thawed. Natural stabilization appears unlikely.

The proposed new airport will be located approximately 1.6 miles west of the existing airport, on the west side of Kuchoruk Creek. The project will include a new access road with a single-span bridge, a 4600-foot-long runway, taxiway, apron, and snow removal equipment building. We conducted centerline investigations on three alternative runway alignments referred to in this report as Alternatives (Alt) #1, #2, and #3, as shown in Appendix A.

Physical setting

Climate

Noatak is located in northwestern Alaska, 25 miles inland from the Chukchi Sea coast. The village lies in a river valley surrounded by hills and mountains. The climate is transitional between maritime and continental. Surface winds are generally light to moderate, typically from the northeast. The climate record for Noatak is short and inconsistent. The following data are from the Kotzebue Airport, which is 55 miles to the south on the coast. Noatak is expected to be somewhat cooler and drier.

Climate data summary for the Kotzebue Airport, period from 1949 to 2005

(in °F)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Aver. High	4.5	3.8	8.8	21.5	38.3	50.6	59.2	56.5	46.7	28.1	14.1	5.0	28.1
Aver. Low	-8.7	-10.4	-7.6	4.0	25.1	38.7	48.6	47.0	36.9	18.9	3.4	-7.9	15.7
Precip (in)	0.46	0.4	0.35	0.43	0.37	0.55	1.43	2.14	1.58	0.8	0.6	0.53	9.63
Snow (in)	7.0	6.0	5.7	5.3	1.4	0.1	0	0	1.1	6.6	9.6	9.1	52.1

Data source: Western Regional Climate Center, www.wrcc.dri.edu

The following freeze/thaw indices are based on UCAN data (Unified Climate Access Network) through the AEDIS (Alaska Engineering Design Information System) web site. The thawing index, or degree-days above freezing, is a measure of thawing that occurs during the year. The thawing index listed below takes the annual thawing-degree-days (TDD) for the last thirty years and averages them. The design thawing index takes the average of the three warmest (highest) TDD over the last thirty years.

Likewise, the freezing index, or degree-days below freezing, can be used to calculate the depth of ground freezing during winter. The freezing index listed below averages the annual freezing-degree-days (FDD) for the past thirty years. The design freezing index averages the three coldest (highest) FDD for the same period. The alternate freezing index averages the three warmest (lowest) FDD. Data are from the Kotzebue Airport; the project site should be slightly cooler.

Thermal indices based on temperature records, 1976 to 2005, Kotzebue Airport

Thawing Index (average annual thawing-degree-days (TDD) of last 30 years)	2200
Design Thawing Index (average of warmest three annual TDDs in 30 yrs)	2673
Freezing Index (average annual freezing-degree-days (FDD) of last 30 years)	5459
Design Freezing Index (average of coldest three annual FDDs in 30 yrs)	6762
Freezing Index Alt. (average of warmest three annual FDDs in 30 yrs)	4435

Data source: AEDIS (Alaska Engineering Design Information System), https://rsgis.crrel.usace.army.mil/aedis/index.html

Geology

The project site lies within the Noatak River valley, south and east of the Mulgrave Hills, west of the Maiyumerak Mountains and north of the Igichuk Hills. At Noatak, the valley is approximately 25 miles wide. The Noatak River flows west out of the Brooks Range and turns south before passing the village of Noatak. About 30 miles down stream, the river enters a canyon through the Igichuk Hills, and then flows into Kotzebue Sound. Noatak is situated between Cape Krusenstern National Monument to the west and Noatak National Preserve to the east.

The site lies within the Mission Lowlands, a "broad tundra flat, containing thaw lakes and pingos 25 to 300 feet high and crossed by the forested flood plain of the Noatak River; it merges with the surrounding foothills by silt uplands intricately dissected by thaw sinks. The entire valley of the Noatak was probably glaciated in pre-Wisconsin time, but glaciers of Wisconsin time [did not reach Noatak]" (Warhraftig, 1965). During the interglacial period, great glaciofluvial outwash deposits (i.e. gravel) were formed in the valley. Depth of alluvial fill over bedrock in the lowlands is unknown. The region is generally underlain by continuous permafrost except, for example, beneath rivers.

Fine-grained deposits of the Mission Lowland have been mapped in nearby Noatak National Preserve on the valley floor and adjacent foothills. These thick silt deposits "were formed in part by lacustrine processes and in part by slow-moving floodwaters retarded by the narrow outlet" at Noatak Canyon (Hamilton and Giffen, 2006). Younger lacustrine deposits are found on the valley floor and up to elevations of 450 feet above sea level. Older deposits are found up to elevations of 850 feet. Based on this description and geologic setting, the silt mantle that overlies the project site and the low, rolling hills to the west are likely part of the Mission Lowland unit.

Historically, the project area has low seismicity. A search of the Alaska Earthquake Information Center (AEIC) web site (www.aeic.alaska.edu) for the area between N66° and N69°, and W162° and W165°, indicates no earthquakes greater than Magnitude 4.0 have been recorded since 1898. Using the USGS interactive probabilistic seismic hazards deaggregation web site, the peak horizontal ground acceleration with a 10% probability of exceedence in 50 years and mean return period of 475 years was calculated to be 0.09396 g for the project site.

Field investigation

NRMS field personnel included Engineering Geologist J. Rowland, and Drillers S. Parker and J. Cline. Centerline and material site drilling occurred between March 23 and April 19, 2006. Exploration at the existing airport occurred on September 28, 2006. Drilling was accomplished using a track-mounted CME-45C. Most test holes were completed using 6-inch O.D. solid-stem auger. The remainder used 6.5-inch O.D. hollow-stem auger. Soil samples were collected either from auger cuttings or with 2-inch O.D. split-spoons driven by a 140-pound auto-hammer.

Soil samples and test hole conditions were logged in the field, and selected samples were submitted to Northern Regions Materials Laboratory for testing. The testing program included particle size gradations for classification, moisture content analyses, and organic content analyses, as well as quality testing on gravel (material site) samples.

We installed a 1-inch-diameter PVC casing in test hole 06-41 (Alt. #1 runway, north end) for ground temperature monitoring. Ground temperatures are presented in Appendix E.

Proposed alignments and test hole locations were provided by project designer J. Reinikainen. Final locations were selected in the field. Test holes were generally drilled on 300-foot spacings along the runway centerline and at 500-foot spacings at the Noatak River material site. Locations were recorded using a Garmin 72 hand-held GPS (datum WSG 84). Holes were backfilled with cuttings and marked with lath.

Expected physical site conditions

Based on this investigation and the general site geology, the following physical site conditions should be anticipated during construction:

- Expect to find frozen ground, either seasonally or perennially frozen, anywhere within the project area at any time of the year.
- Expect to encounter massive ice anywhere within the project area.
- Expect the river level and water table at the gravel bar material site to vary from levels shown on logs.
- Expect the configuration of the gravel bar material site to change significantly from the time of exploration due to river action over time.

Site and subsurface conditions

The new airport site is relatively flat with minor relief: a small hill (10 to 15 ft high) lies between the north end of the proposed runway (Alternative #1) and the bridge site, near where the apron may go. At the time of exploration the site was covered with 2 to 3 feet of snow. Air photos indicate numerous ponds and drainages across the broad valley floor, though few in the proposed airport footprint itself. Air photos also show patterned ground indicating ice-wedge polygons. Vegetation is primarily shrub-sedge tussock

tundra with sparse willow. The area has few trees, mainly spruce clustered along Kuchoruk Creek and other better-drained areas.

Foundation soils throughout the new airport site were fairly uniform, though the amount of ice and organics varied. The typical profile consisting of the following generalized sequence:

- 6 to 12-inch-thick organic mat;
- 6 to 12 inches of peat with ice-rich silt;
- brown to gray silt with organics and ice (visible, excess to Nbe) to depths of 15 to 22+ feet;
- 1 to 2 feet of gray silt with sand to fine sandy silt, Nbe;
- underlain by gray, silty to slightly silty, sandy gravel to gravelly sand, Nbe to Vr, to the depth drilled. The depth to top of gravel across the site ranged from 13 feet to deeper than 25 feet, averaging 17 to 19 feet.
- In numerous test holes, we intercepted massive ice up to several feet thick (discussed below).

We found permafrost conditions in every test hole, extending to the depths drilled. The active layer is on the order of 2-feet-thick, but we could not precisely determine this as soils were continuously frozen from the surface down. The organic and silt soils contained significant amounts of excess ice often with visible ice lenses. In general, the amount of organics and ice decreased with depth. Underlying sand and gravel layers contained trace organics and less ice.

We intercepted thick layers of ice in five test holes at the north end of Alternative Runway #3. In test holes 06-55, 06-56, 06-60, 06-61 and 06-62 we found buried layers of ice from 6- to 16-feet-thick. In air photos, this area shows distinct patterned ground, i.e. polygons, indicating the presence of ice wedges. For this reason, we recommend avoiding this location.

We intercepted layers of massive ice in two test holes along the southern end of Alternative Runway #1 (06-47 and 06-49), and around the possible apron/pad site for Alt. #1 (06-69, 06-70, and 06-76). These findings reinforce the fact that ice conditions are variable across the site and massive ice may be present anywhere, at any depth.

Ground temperatures for the runway site at test hole 06-41 are shown at the end of Appendix E. From 15 to 24 feet (bottom of hole), the temperature was between 29 and 30°F. Temperature data was also collected at the access road bridge site (see Foundation Geology Report). Frozen ground temperatures in the upper 20 feet were typically warmer than 30°F (not including seasonal variability). The active layer is estimated to be about 2 to 3 feet thick.

Existing airport investigation

Six test holes were drilled through the embankment of the Noatak Airport on September 28, 2006. Test hole locations, logs and testing results are found at the end of Appendices A, C, and D, respectively. The typical soil profile consisted of the following:

- 6 inches of crushed aggregate surface course, generally ¾-inch-minus material, well-graded sand with gravel.
- Embankment borrow to depths of 7.5 to 11 feet, consisting of well- to poorly-graded gravel with silt and sand. The gravel is alluvial, round to subround, and generally 2-inch-minus. In some areas, especially the 1992 AIP locations (06-104, 06-105), it appeared that silt had been blended in. The embankment was typically moist to wet with the lower 1-foot being wet. The apron area and north end of the runway found loose (relative density) conditions, and material lacked fines. The south end of the runway appeared to be more compact, perhaps due to more fines in the material.
- A geotextile separator was intercepted in TH06-105 at the base of the embankment, at the south end of the runway. This corresponds to as-built drawings from 1992.
- Foundation soils: brown to gray, wet and loose (where thawed) silt with organics. The thickness of the thawed zone beneath the fill ranged from 0 to 1.5 feet thick. This was underlain by frozen conditions to the depths drilled. A split-spoon sample of this material showed significant visible ice.

The active layer thickness adjacent to the embankment (in somewhat disturbed natural ground with ponded water) was 2 feet at several locations. This was measured using a ½-inch diameter steel rod probe.

Summary of findings, existing airport embankment drilling

TH ID	Fill thickness (feet)	Thickness of thawed layer beneath fill	Comments
06-100	8	1	New apron area, constructed in 1992
06-101	10.5	0	Through old embankment and 1987 embankment, Approx. Sta 111+60, near CL
06-102	9	0.5	Approx Sta 111+60, east shoulder. Soft shoulders w/ cracking observed.
06-103	8	0.5	Approx Sta 111+60, west shoulder.
06-104	11	1	Approx Sta 147+00, near CL. In 1992 construction area, just south of older runway in thaw settlement area.
06-105	7.5	1.5	Approx. Sta 156+70, near CL, south end of runway in 1992 construction area. Geotextile present at base of fill.

Notes
1. The amount of embankment settlement relative to original ground surface was not determined due to lack of elevation data.
2. Suspect that much of initial settlement/compression in most recent embankment (1992) occurred during construction which was performed in summer.
3. The thaw depth is expected to increase somewhat into October or November.

Thermal Analyses

Margaret Darrow, Geotechnical Engineering Assistant, conducted thermal modeling of the proposed runway using GEO-SLOPE TEMP/W. The results are presented in Appendix E. The purpose of modeling was to determine the optimum embankment configuration under which the least amount of thaw is predicted. The model results

indicate that no thaw would occur below the centerline of a 14-foot-high embankment, or below the centerline of an 8-foot-high embankment with 4 inches of insulation placed either at the ground surface or 2 feet above the ground surface within the embankment. Model results indicate that in the latter configuration, the portion of the embankment below insulation would freeze within 10 years after construction.

For all embankment configurations, at least 4.5 feet of thaw will occur below the toe of foreslope. A comparison of embankments with 4H:1V foreslopes and 2H:1V foreslopes indicates that use of 4:1 foreslopes results in an outward shift of thawing, away from structural fill.

Based on this analysis, expect longitudinal cracking along the embankment foreslopes, the development of thaw ponds along the toe, and general settlement of the foreslopes. Consider the placement of thermal berms to move this thawing away from the structural embankment. Berms or slope flattening cover could be composed of silt, though no specific source has been identified.

General comments and recommendations

From the investigation, the foundation soils consist of ice-rich, organic-rich silt with sporadic areas of massive ice. These materials are highly thaw-unstable. If foundation soils thaw beneath embankments, settlement on the order of 1 to 4 feet or more could result.

Because of the potential for significant thaw settlement throughout the project and especially differential settlement, the main geotechnical objectives are to limit thaw settlement to the extent practical and minimize thaw settlement beneath structural sections of embankments.

- Based on the thermal analyses, we recommend designing a 14-foot thick runway embankment (without insulation) or an 8-foot thick embankment with 4 inches of insulation placed either on the ground surface or 2 feet above the ground surface.
- We recommend using 4H:1V foreslopes, to shift thawing outward, away from the structural fill.
- Staging embankment construction to occur when the active layer is frozen will help maintain frozen conditions under embankments.
- Place geotextile separator fabric over existing ground surface below all embankments. A high-strength geotextile may be necessary to allow equipment to place fill over soft terrain (if summer/fall construction).
- Fill from the existing airport runway embankment is suitable surfacing material due to its higher fines. It can also be used for general embankment construction.
- Minimize clearing and preserve the organic mat under and outside embankment footprint.
- Avoid siting facilities, to the extent possible, in natural drainages and ponds.
- Avoid cuts.

- Design for and maintain drainage throughout the project. Contact the Northern Region Hydraulics Engineer for specific drainage-related recommendations.
- Access road: if some settlements are acceptable, the road embankment can be reduced to less than the depth that will keep thaw penetration out of the ice-rich foundation soils (~14 ft). An 8-foot-thick road embankment would be a reasonable compromise between acceptable embankment material costs and acceptable settlements. If constructed with 3:1 foreslopes or flatter, settlements induced by toe thaw should not impact the structural core of the embankment. Place the embankment over a geotextile fabric on existing ground surface. This option does anticipate some differential settlement, so ongoing road maintenance is expected

Material Sites

Several sites were considered to provide materials for the project, and two were drilled. The primary site is a large gravel bar of the Noatak River located 2 miles southeast of the new airport. This site is discussed in Appendix F.

The second site is the existing airport embankment, which was drilled in September 2006. A preliminary memo in Appendix G discusses the materials available and some geotechnical issues. The embankment was constructed using river gravel. In general, the material is similar to material at the gravel bar, but has higher fines content. The P-200 ranged from 4 to 10.5% for well- and poorly-graded gravel with silt and sand. The material meets quality criteria for surface aggregate. The LA Abrasion loss was 22 and the degradation factor was 84. The main concern with this site is maintaining continuous use of the runway while removing material.

Other gravel bars along the Noatak River were considered, though the explored site was preferred for this project due its large volume and proximity to the west side of the river (i.e. no river crossings). In addition to active floodplain sites, other considered sites included the forested east side of the Noatak floodplain and the vegetated confluence of the Kuchak River with the Noatak, located about 3 miles north of the village of Noatak.

Mining buried gravel close to the project was considered. The cost of stripping 15+ feet of frozen overburden, disposing of overburden, and mining frozen gravel would be significantly higher than mining thawed, clean gravel from the river.

An upland source was considered. We drilled several test holes on hills west of the project site and found 25 feet of silt with massive ice (Mission Lowlands unit). Test holes 06-37 to 06-39 and 06-71 to 06-73 were all drilled looking for terraced gravel, but none was found.

Higher hills further to the west, and over 6 miles from the project, had rock rubble at the surface. Two of these hilltops were examined in August 2006 with the use of a helicopter, and samples were collected. No rock outcrops were observed as the hills are rounded, presumably weathered and covered by silt and colluvium overburden. The rock rubble was observed on only a few hilltops as clustered, frost-heaved stone. Rock types include sandstone and siltstone. Cobble-sized rocks were collected for quality testing. Sample results can be found in Appendix H with a map showing sample locations. One

sample met quality criteria for surface aggregate while the other did not. These hilltop sites lie about 1 mile east of Cape Krusenstern National Monument. A 6+-mile long access road would have to be built over hilly terrain with poor foundation soils to reach either of these sites.

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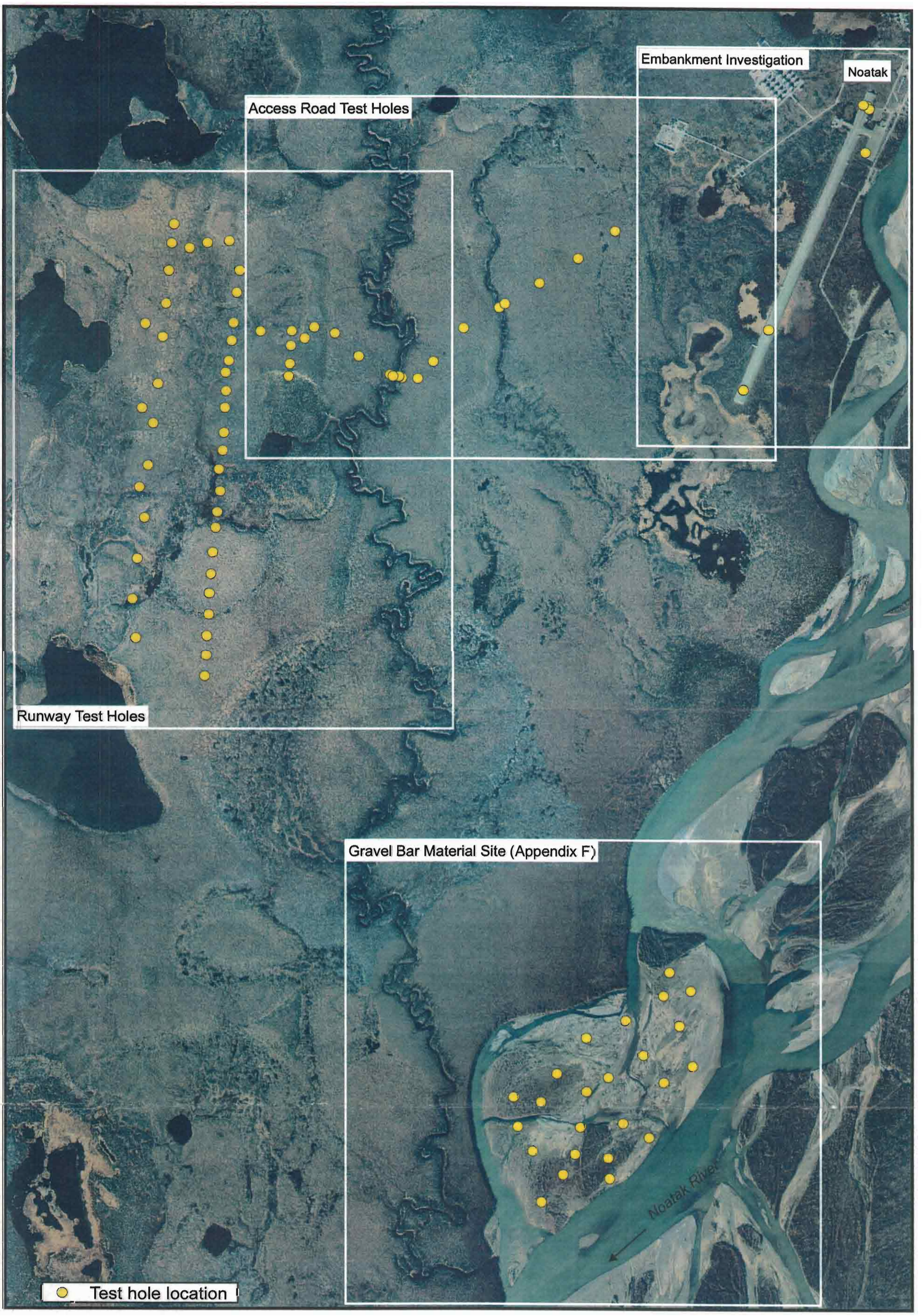
Western Regional Climate Center, (www.wrcc.dri.edu) for climate data.

Appendix A

Site maps



Noatak Airport Relocation
Project Overview

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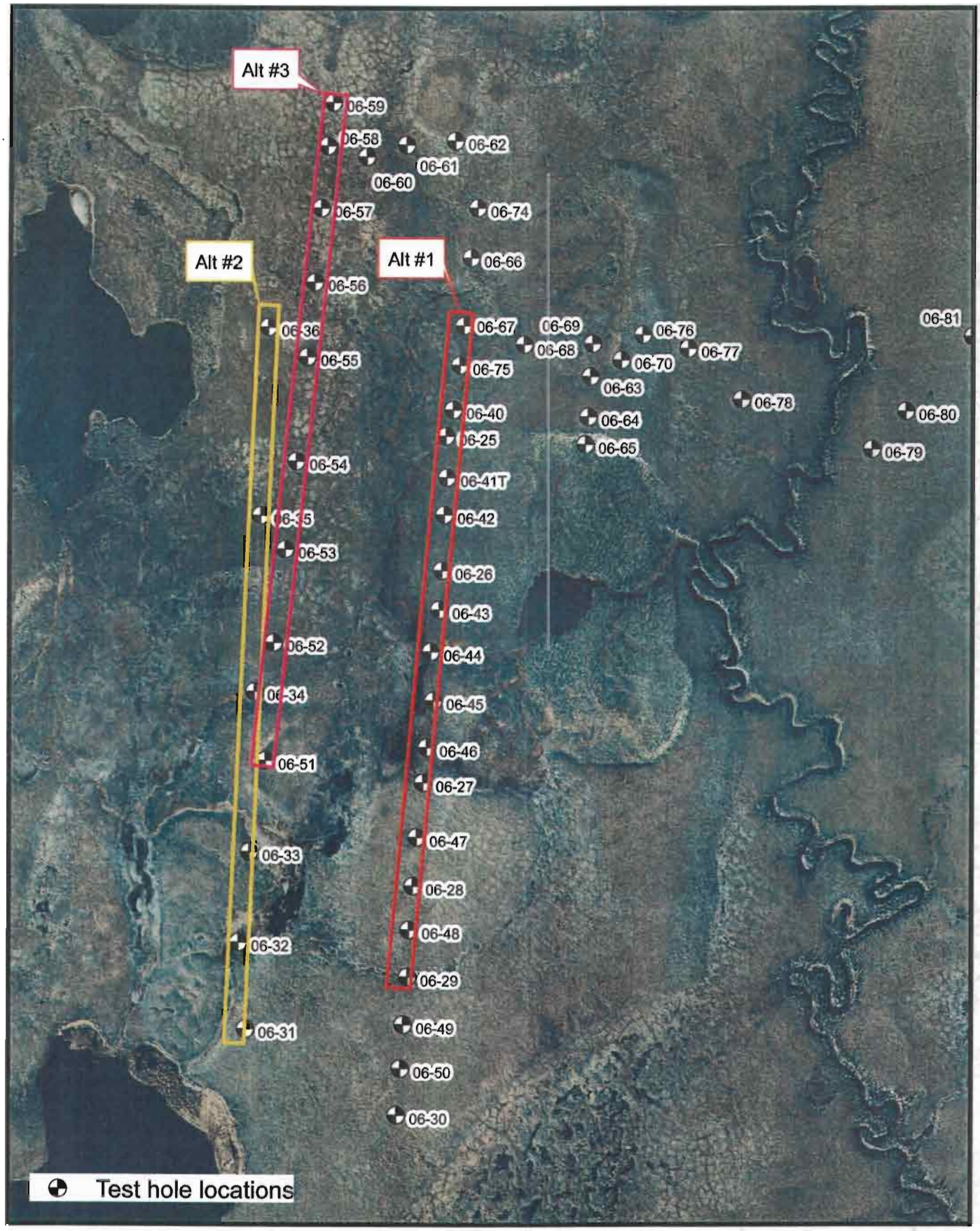

Noatak Airport Relocation
Runway Test Holes

0 1,000 2,000 Feet

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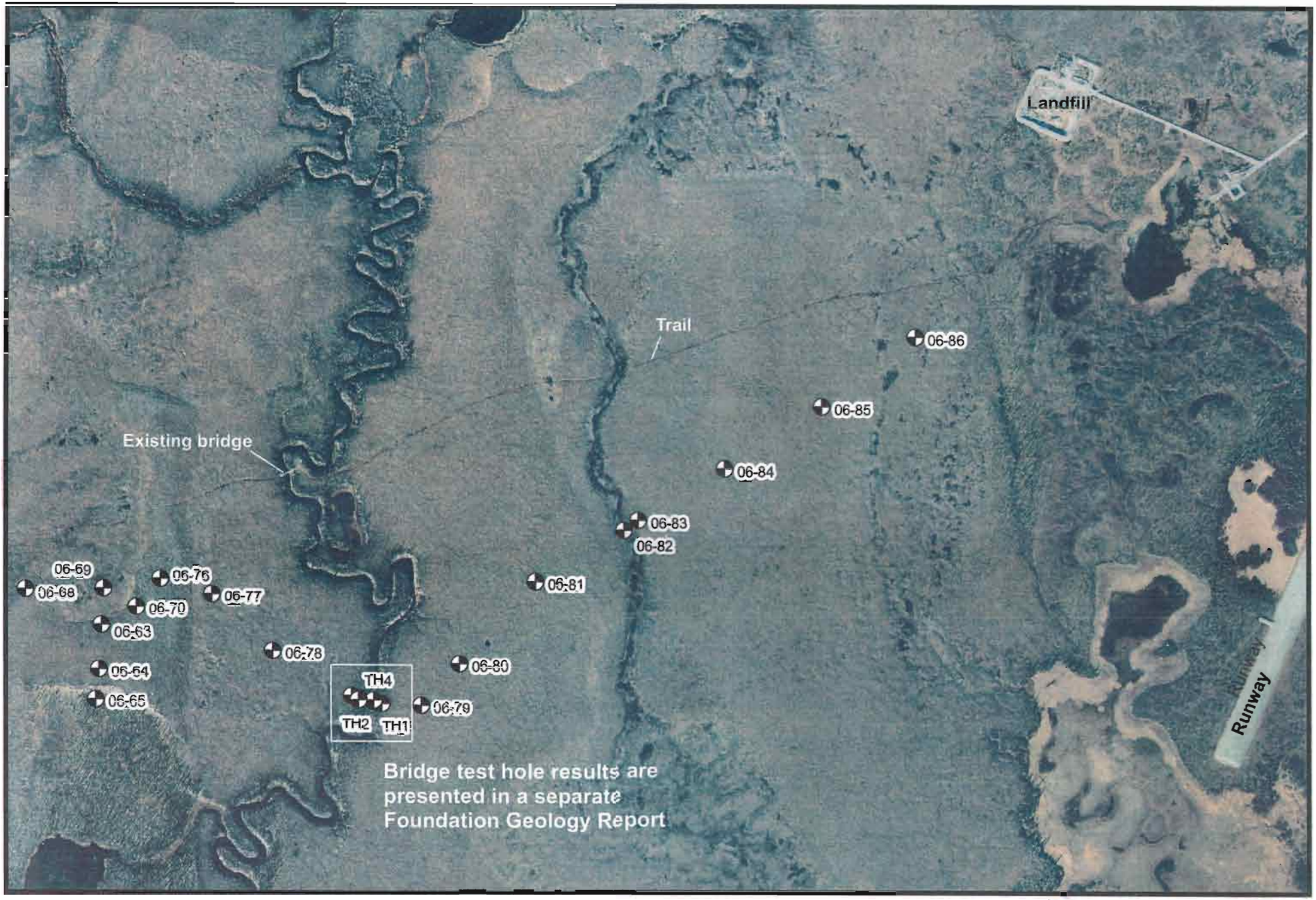


Noatak Airport Relocation
Access Road Test Holes

0 500 1,000 1,500 Feet

N
W E
S

NOATAK AIRPORT
EMBANKMENT INVESTIGATION
TEST HOLE LOCATIONS

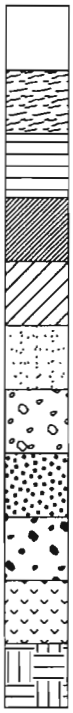
0 250 500 1,000 Feet

Appendix B

Symbols and definitions
Unified Soils Classification System
Frozen soil classification

SYMBOLS AND DEFINITIONS

BASIC MATERIAL SYMBOLS



ASPHALT

PEAT

CLAY (Cl)

ICE

SILT (Si)

POORLY GRADED SAND (Sa)

POORLY GRADED GRAVEL (Gr)

WELL GRADED SAND

WELL GRADED GRAVEL

BEDROCK (Bx), soft(Type)

BEDROCK (Bx), hard(Type)

SOFT OR HARD BEDROCK BASED ON DRILLING RATE

NOTE

MAIN COMPONENT (UPPER CASE ... SOLID LINES)
MINOR COMPONENT (Title Case ... DASHED LINES OR SPARSER PATTERN)

USCS SIZE DEFINITIONS

BOULDERS (Boulders)	12"+
COBBLES (Cobbles)	3" TO 12"
GRAVEL	#4 TO 3"
ANGULAR FRAGMENTS	#10 +
SAND	#200 TO #4
SILT	#200 TO 0.005 mm
CLAY	MINUS 0.005 mm

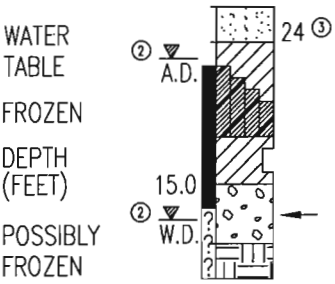
TEST RESULTS

_._%-200	= % PASSING #200 SIEVE
NM _._%	= NATURAL MOISTURE
ORG _._%	= ORGANIC CONTENT
SSc _	= SODIUM SULFATE LOSS(coarse)
SSf _	= SODIUM SULFATE LOSS(fine)
LA _	= LOS ANGELES ABRASION
DEG _	= DEGRADATION
LL _	= LIQUID LIMIT (NV = no value)
PI _	= PLASTIC INDEX (NP = non-plastic)

MISC.

Tr	= TRACE
sl	= SLIGHTLY
hi	= HIGHLY
w/_	= WITH UNSPECIFIED AMOUNT
X'tls	= CRYSTALS
TH	= TEST HOLE
TT	= TEST TRENCH
TP	= TEST PIT

TYPICAL LOG



① Station value may also be on centerline e.g. Sta 210+53, CL or lat-long format e.g. N64.56789°, W145.67890°

② W.D.= WHILE DRILLING, A.D.= AFTER DRILLING

③ "N VALUE" INDICATES STANDARD PENETRATION TEST (1.4" I.D., 2.0" O.D. SAMPLER DRIVEN WITH 140 LB. HAMMER, 30" FREE FALL) AND IS SUM OF 2nd AND 3rd 6" OF PENETRATION.

PLAN VIEW SYMBOLS

POWER AUGER TEST HOLE (TH)

HAND AUGER TEST HOLE (TH)

EXPOSED MATERIAL

PROBE

HAND DUG TEST PIT (TP)

DOZER/BACKHOE TEST TRENCH (TT)

BODY OF WATER

FLOW DIRECTION

WASTE BERM

BANK

SWAMP

TREELINE

SOIL DENSITY/CONSISTENCY DESCRIPTORS

NON-COHESIVE RELATIVE DENSITY	BLOWS/FOOT (N) VALUE	COHESIVE CONSISTENCY	BLOWS/FOOT (N) VALUE
VERY LOOSE	< 4	VERY SOFT	< 2
LOOSE	5-10	SOFT	2-4
MEDIUM DENSE	11-30	FIRM	5-8
DENSE	31-50	STIFF	9-15
VERY DENSE	> 50	VERY STIFF	16-30
		HARD	> 30

COLOR

Bk = BLACK	Gy = GRAY	Tn = TAN
Bl = BLUE	Or = ORANGE	Wh = WHITE
Bn = BROWN	Rd = RED	Yw = YELLOW
Gn = GREEN		

MOISTURE

dry	= < OPTIMUM*	DUSTY, DRY TO THE TOUCH
moist	~ OPTIMUM*	DAMP, NO VISIBLE WATER
wet	= > OPTIMUM*	VISIBLE FREE WATER

* OPTIMUM MOISTURE FOR MAXIMUM DENSITY

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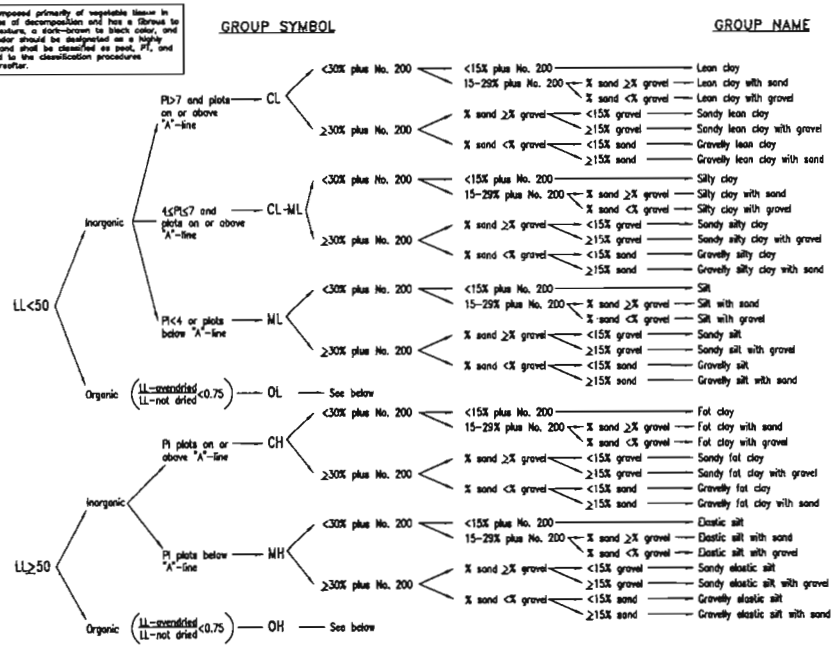
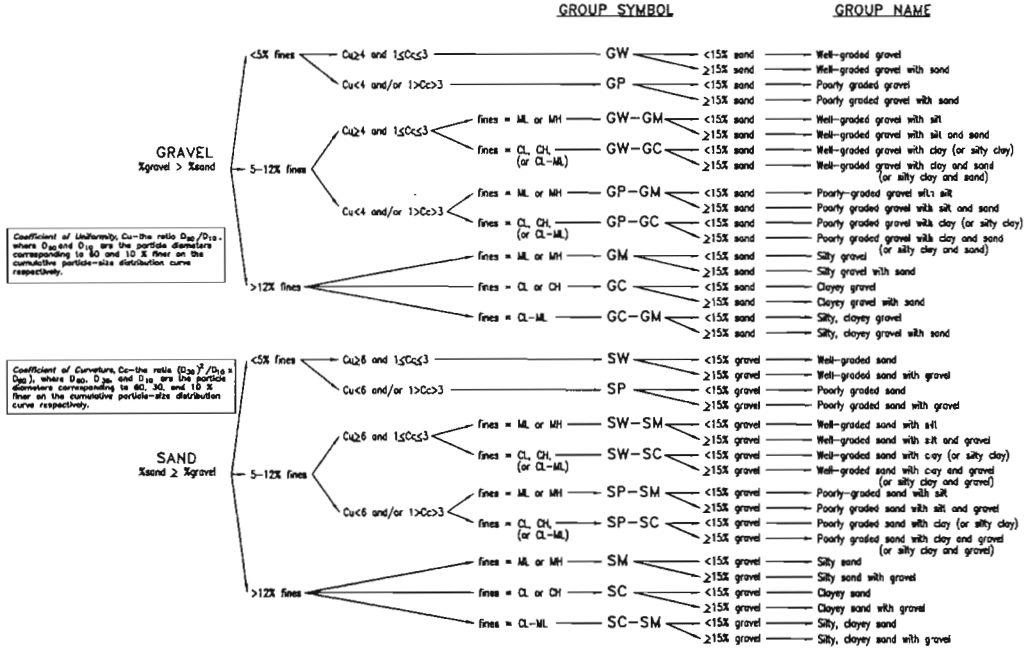
Classification of Soils for Engineering Purposes (Unified Soil Classification System)

A sample composed primarily of vegetable tissue in various stages of decomposition and has a fibrous to amorphous texture, a dark-brown to black color, and an organic odor should be designated as a highly organic soil and shall be classified as peat, PT, and not subjected to the classification procedures described hereafter.



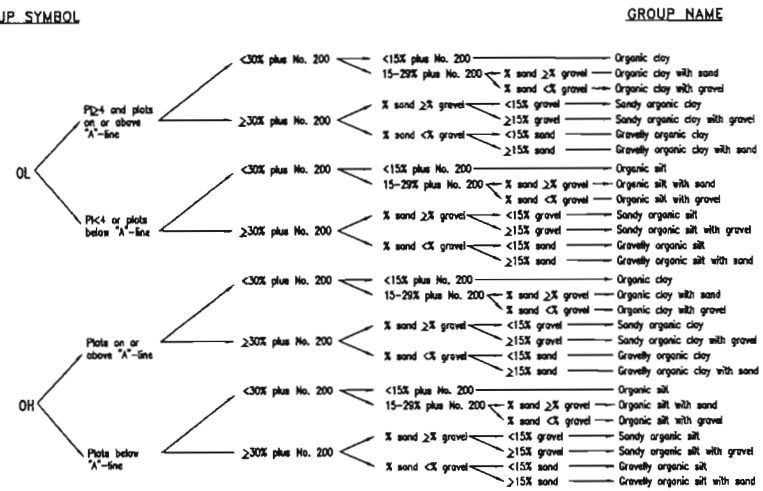
Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)



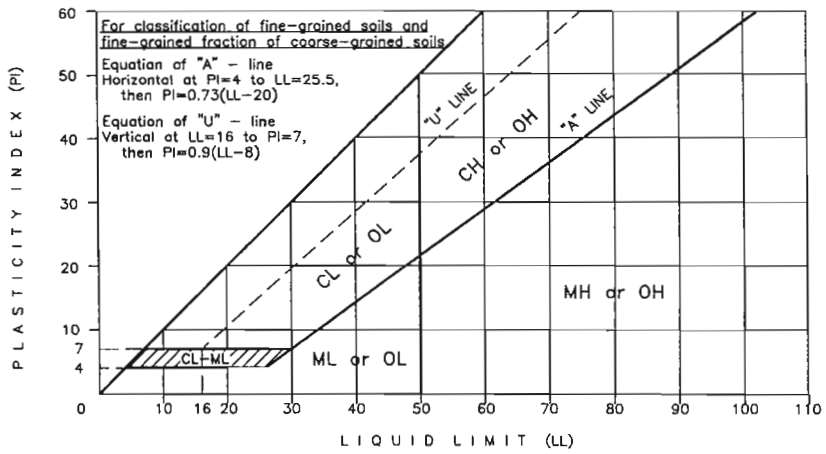
Coefficient of Uniformity, Cu = the ratio D_{60}/D_{10}, where D_{60} and D_{10} are the particle diameters corresponding to 60 and 10 % finer on the cumulative particle-size distribution curve respectively.

Coefficient of Curvature, Cc = the ratio $(D_{30})^2/D_{10} \times D_{60}$), where D_{60}, D_{30}, and D_{10} are the particle diameters corresponding to 60, 30, and 10 % finer on the cumulative particle-size distribution curve respectively.

Flow Chart for Classifying Coarse-Grained Soil (More Than 50% Retained on No. 200 Sieve)



Flow Chart for Classifying Organic Fine-Grained Soil (50% or More Passes No. 200 Sieve)



Plasticity Chart

DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS

Part I Description of Soil Phase (a) (Independent of Frozen State)	Major Group		Sub-Group		Field Identification (6)	Pertinent Properties of Frozen Materials which may be measured by physical tests to supplement field identification. (7)	Guide for Construction on Soils Subject to Freezing and Thawing	
	Description (2)	Designation (3)	Description (4)	Designation (5)			Thaw Characteristics (8)	Criteria (9)
Part II Description of Frozen Soil	Segregated ice is not visible by eye (b)	N	Poorly Bonded or Friable	Nf	Identify by visual examination. To determine presence of excess ice, use procedure under note (c) below and hand magnifying lens as necessary. For soils not fully saturated, estimate degree of ice saturation: Medium, Low. Note presence of crystals, or of ice coatings around larger particles.	In-Place Temperature Density and Void Ratio a) In Frozen State b) After Thawing in Place Water Content (Total H_2O, including ice) a) Average b) Distribution Strength a) Compressive b) Tensile c) Shear d) Adfreeze Elastic Properties Plastic Properties Thermal Properties Ice Crystal Structure (using optional instruments.) a) Orientation of Axes b) Crystal size c) Crystal shape d) Pattern of Arrangement	Usually Thaw-Stable	The potential intensity of ice segregation in a soil is dependent to a large degree on its void sizes and may be expressed as an empirical function of grain size as follows: Most inorganic soils containing 3 percent or more of grains finer than 0.02 mm in diameter by weight are frost-susceptible. Gravels, well-graded sands and silty sands, especially those approaching the theoretical maximum density curve, which contain 1.5 to 3 percent finer than 0.02 mm by weight without being frost-susceptible. However, their tendency to occur interbedded with other soils usually makes it impractical to consider them separately. Soils classed as frost-susceptible under the above criteria are likely to develop significant ice segregation and frost heave if frozen at normal rates with free water readily available. Soils so frozen will fall into the thaw-unstable category. However, they may also be classed as thaw-stable if frozen with insufficient water to permit ice segregation. Soils classed as non-frost-susceptible (*NFS) under the above criteria usually occur without significant ice segregation and are not exact and may be inadequate for some structure applications: exceptions may also result from minor soil variations. In permafrost areas, ice wedges, pockets, veins, or other ice bodies may be found whose mode of origin is different from that described above. Such ice may be the result of long-time surface expansion and contraction phenomena or may be glacial or other ice which has been buried under a protective earth cover.
			No excess ice Well Bonded Excess ice	Nb: n / e				
	Segregated ice is visible by eye. (Ice 1 inch or less in thickness) (b)	V	Individual ice crystals or inclusions	Vx	For ice phase, record the following as applicable: Location Size Orientation Shape Thickness Spacing Pattern of arrangement Length Hardness } Structure } per part III Below Color } Estimate volume of visible segregated ice present as percent of total sample volume		Usually Thaw-Unstable	
			Ice coatings on particles	Vc				
			Random or irregularly oriented ice formations	Vr				
			Stratified or distinctly oriented ice formations	Vs				
Part III Description of Substantial Ice Strata	Ice (Greater than 1 inch in thickness)	Ice	Ice with soil inclusions	Ice + Soil Type	Designate material as ICE (d) and use descriptive terms as follows, usually one item from each group, as applicable: Hardness: Hard; Soft (mass, not indi-crystals) Structure: Clear; Cloudy; Porous; Candled; Granular; Stratified Color: e.g.: Color-less; Gray; Blue Admixtures: e.g.: Contains Thin Silt Inclus-ions	Same as Part II above, as applicable, with special emphasis on Ice Crystal Structure.		
			Ice without soil inclusions	Ice				

DEFINITIONS:

Ice Coatings on Particles are discernible layers of ice found on or below the larger soil particles in a frozen soil mass. They are sometimes associated with hoarfrost crystals, which have grown into voids produced by the freezing action.

Ice Crystal is a very small individual ice particle visible in the face of a soil mass. Crystals may be present alone or in a combination with other ice formations.

Clear Ice is transparent and contains only a moderate number of air bubbles. (e)

Cloudy Ice is translucent, but essentially sound and non-pervious

Porous Ice contains numerous voids, usually interconnected and usually resulting from melting at air bubbles or along crystal interfaces from presence of salt or other materials in the water, or from the freezing of saturated snow. Though porous, the mass retains its structural unity.

Candled Ice is ice which has rotted or otherwise formed into long columnar crystals, very loosely bonded together.

Granular Ice is composed of coarse, more or less equidimensional, ice crystals weakly bonded together.

Ice Lenses are lenticular ice formations in soil occurring essentially parallel to each other, generally normal to the direction of heat loss and commonly in repeated layers.

Ice Segregation is the growth of ice as distinct lenses, layers, veins and masses in soils, commonly but not always oriented normal to direction of heat loss.

Well-bonded signifies that the soil particles are strongly held together by the ice and that the frozen soil possesses relatively high resistance to chipping or breaking.

Poorly-bonded signifies that the soil particles are weakly held together by the ice and that the frozen soil consequently has poor resistance to chipping or breaking.

Friable denotes a condition in which material is easily broken up under light to moderate pressure.

Thaw-Stable frozen soils do not, on thawing, show loss of strength below normal, long-time thawed values nor produce detrimental settlement.

Thaw-Unstable frozen soils show on thawing, significant loss of strength below normal, long-time thawed values and/or significant settlement, as a direct result of the melting of the excess ice in the soil.

Modified from: Linell, K. A. and Kaplar, C. W., 1966, *Description and Classification of Frozen Soils*, Proc. International Conference on Permafrost (1963), Lafayette, IN, U.S. National Academy of Sciences, Publ. 1287, pp 481-487.

NOTES:

(a) When rock is encountered, standard rock classification terminology should be used.

(b) Frozen soils in the N group may on close examination indicate presence of ice within the voids of the material by crystalline reflections or by a sheen on fractured or trimmed surfaces. However, the impression to the unaided eye is that none of the frozen water occupies spece in excess of the original voids in the soil. The opposite is true of frozen soils in the V group.

(c) When visual methods may be inadequate, a simple field test to aid evaluation of volume of excess ice can be made by placing some frozen soil in a small jar, allowing it to melt and observing the quantity of supernatant water as a percent of total volume.

(d) Where special forms of ice, such as hoarfrost, can be distinguished, more explicit description should be given.

(e) Observer should be careful to avoid being misled by surface scratches or frost coating on the ice.

Appendix C

Test hole logs

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-25
Project Number	AKSAS 61478	Total Depth	25 feet
		Dates Drilled	3/30/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 0-10 deg F, 10 mph wind, N
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55624, W163.04009
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								Bn SILT *hi Org*, Vs
	2–5								
	6								Gy SILT *Org*, Vs, to Nbe. Frequent peat layers
	7–17								
	18								Gy SILT w/ Sand Nbe
	19								Gy Silty GRAVEL w/ Sand Nbe, to Vr
	20–24								
	25								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/30/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-26
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	3/30/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 0-10 deg F, 10 mph wind, N
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55384, W163.04016
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 06-6010, 06-6011; Blow Count; N-Value; Frozen; Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	Bn SILT
2	*hi Org*, Vs
3	Bn-Gy SILT
4	*Org*, Vs, to Nbe, occasional peat layers
5	SAMPLE 06-6010: NM 61.5%, ORG 5.5%
15	Gy Sandy SILT
16	Nbe
17	Gy Poorly-graded GRAVEL
18	w/ Silt & Sand
19	Nbe
20	SAMPLE 06-6011: GP-GM, POORLY GRADED GRAVEL with SILT and SAND , 7.9% -200, NV, NP
22	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/30/07

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-27
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	3/30/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 0-10 deg F, 10 mph wind, N
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55005, W163.04086
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT *hi Org*, Vs
	5							Bn SILT *Org*, Vs
	10							Gy Silty SAND *sl Org*, Nbe
	19							Gy Silty GRAVEL w/ Sand Nbe
	22							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/30/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-28
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/30/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 0-10 deg F, 10 mph wind, N
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54821, W163.04124
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Sample Data: Depth in (Feet) | Method | Number | Blow Count | N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth	Method	Number	Material
0			ORG MAT
1	AUGER	06-6012	Bn SILT *hi Org*, Vs
2			SAMPLE 06-6012: NM 157.4%, ORG 32.0%
3			
4			
5			
6	AUGER	06-6013	
7			SAMPLE 06-6013: NM 285.8%, ORG 27.3%
8			Bn SILT *Org*, Vs, to Nbe
9			
10			
11			
12			
13			
14			Gy SILT Nbe
15			
16			
17			
18			
19	AUGER	06-6014	Gy Silty SAND Nbe
20			SAMPLE 06-6014: SM, SILTY SAND , 47.9% -200, NM 28.2%, NV, NP
21			Gy Silty GRAVEL w/ Sand
22			Nbe BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/30/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-29
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/30/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 0-10 deg F, 10 mph wind, N
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54659, W163.04142
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 06-6015; Blow Count; N-Value; Frozen; Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	Bn-Gy SILT *hi Org*, Vs
4	SAMPLE 06-6015: NM 173.6%, ORG 10.9%
10	Gy SILT *Org*, Vs
18	Gy Sandy SILT Nbe
22	Gy Silty GRAVEL w/ Sand Nbe
22	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/30/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-30
Project Number	AKSAS 61478	Total Depth	24.5 feet
		Dates Drilled	3/30/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 0-10 deg F, 10 mph wind, N
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54413, W163.04181
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1	AUGER	06-6016					Bn SILT
	2							*hi Org*, Vs
	3							SAMPLE 06-6016: ML, SANDY SILT , 52.3% -200, NM 238.1%, ORG 40.7%, NV, NP
	4							
	5							
	6							
	7							
	8							
	9	AUGER	06-6017					SAMPLE 06-6017: ORG 14.8%
	10							Bn-Gy SILT
	11							*Org*, Vs, to Nbe
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
	21							
	22							
	23							
	24							Gy SILT
	BOH							w/ Gravel

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-31
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54562, W163.04895
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 2 runway alignment

Drilling Method: S-S Auger

Sample Data: Method, Number, Blow Count, N-Value, Frozen, Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Sample	Material
0		ORG MAT
1	AUGER 06-6018	Bn SILT *hi Org*, Vs
2		SAMPLE 06-6018: NM 350.2%, ORG 54.4%
3		Bn SILT *Org*, Vs
4		
5		
6		
7		
8		
9		
10		Gy SILT Nbe
11		
12		
13		
14		
15	AUGER 06-6019	SAMPLE 06-6019: NM 41.6%
16		
17		
18		
19		
20		Gy Silty SAND w/ Gravel moist, Nbe
21		
22		BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-32
Project Number	AKSAS 61478	Total Depth	24 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54715, W163.04935
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 2 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ICE
	1	AUGER	06-6020					(bog)
	2							PEAT
	3							SAMPLE 06-6020: NM 691.3%, ORG 72.9%
	4							Bn SILT
	5							*hi Org*, Vs
	6							
	7							
	8							Bn-Gy SILT
	9							*Org*, Vs
	10							
	11							
	12							
	13							
	14							
	15							Gy SILT
	16							Nbe
	17							
	18							
	19							
	20							
	21							Gy Silty GRAVEL
	22							w/ Sand
	23	AUGER	06-6021					moist, Nbe
	24							SAMPLE 06-6021: GM, SILTY GRAVEL with SAND , 14.6% -200, NM 8.3%, NV, NP
								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-33
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54877, W163.04892
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 2 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT *hi Org*, Vs
	2							
	3							Bn-Gy SILT *Org*, Vs
	4							
	5							
	6							
	7							
	8							
	9							
	10							Gy SILT Nbe
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							Gy SILT w/ Sand Nbe
	21							Gy Silty GRAVEL w/ Sand
	22							BOH wet, *sl Org*, Nbe

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-34
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55162, W163.04883
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 2 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6022					ORG MAT
	1							Bn-Gy SILT *hi Org*, Vs
	2							
	3							
	4							
	5							
	6							SAMPLE 06-6022: NM 186.8%
	7							
	8							
	9							
	10							Gy SILT Nbe
	11							
	12							
	13							
	14							
	15							
	16							
	17							Gy Sandy SILT Nbe
	18							
	19							Gy Silty GRAVEL w/ Sand wet, Nbe
	20							
	21							
	22							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-35
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55476, W163.04869
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 2 runway alignment

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 06-6023; Blow Count; N-Value

Frozen

Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	Bn-Gy SILT *hi Org*, Vs
7	SAMPLE 06-6023: NM 83.1%
15	Gy Sandy SILT Nbe
18	Gy Silty SAND w/ Gravel Nbe
20	Gy Poorly-graded GRAVEL w/ Silt & Sand wet, Nbe
22	BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples ere taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-36
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55811, W163.04849
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 2 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT *hi Org*, Vs
	2							
	3							
	4							Bn-Gy SILT *Org*, Vs
	5							
	6							
	7							
	8							
	9							Gy SILT *sl Org*, Vs
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
	21							
	22							BOH Gy Silty GRAVEL w/ Sand wet, Nbe

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-40
Project Number	AKSAS 61478	Total Depth	18.5 feet
		Dates Drilled	4/1/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	P. cloudy, 25 deg F, 10-15 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.5567, W163.03977
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1			11				Bn SILT
	2	SPT	06-6024	18				*hi Org*, Vs
	3			18				SAMPLE 06-6024: NM 337.2%, ORG 39.4%
	4			30				Bn SILT
	5							*Org*, Vs
	6							
	7							
	8			20				Bn-Gy SILT
	9	SPT	06-6025	32				*sl Org*, Vs
	10			36				SAMPLE 06-6025: ML, SILT , 95.9% -200, NM 56.3%, NV, NP
	11			50				
	12							Gy SILT
	13			7				Vs
	14	SPT	06-6026	33				
	15			42				SAMPLE 06-6026: NM 37.6%, ORG 3.0%
	16			32				
	17							Gy SILT
	18	SPT	06-6027	17				w/ Sand
				41				Nbe
				35/3"				BOH
								SAMPLE 06-6027: ML, SILT with SAND , 78.1% -200, NM 37.5%, NV, NP

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-41
Project Number	AKSAS 61478	Total Depth	25 feet
		Dates Drilled	4/1/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 25 deg F, 15-20 mph wind, S
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.5555, W163.03999
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | N-Value | Casing Blows / ft | Frozen | Graphic Log

Depth (ft)	Method	Number	Material
0			SUBSURFACE MATERIAL
0			ORG MAT
1–3			Bn SILT *hi Org*, Vs
4–7			Bn-Gy SILT *Org*, Vs
5–6	AUGER	06-6028	SAMPLE 06-6028: ML, 89.8% -200, NM 45.5%, NV, NP
7–17			Gy SILT Vs
14–15	AUGER	06-6029	SAMPLE 06-6029: NM 37.3%, ORG 3.7%
17–19			Gy SILT w/ Sand Nbe
19–25			Gy Poorly-graded GRAVEL w/ Silt & Sand wet, Nbe
21–22	AUGER	06-6030	SAMPLE 06-6030: GP-GM, 9% -200, NM 9.7%, SSc 0.5, SSf 0.8, LA 21, DEG 84, NV, NP
25			BOH

Drilling Notes: Set thermistor casing (1" PVC) to 24 ft bgs, backfilled annulus with frozen cuttings, filled pipe with glycol.

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 6/14/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-42
Project Number	AKSAS 61478	Total Depth	20 feet
		Dates Drilled	4/1/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 25 deg F, 15-20 mph wind, S
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55483, W163.04009
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0	AUGER	06-6031					ORG MAT	0
	1							Bn SILT	1
	2							*hi Org*, Vs	2
	3							Bn SILT	3
	4							*Org*, Vs	4
	5							SAMPLE 06-6031: NM 120.0%, ORG 10.8%	5
	6								6
	7								7
	8							Gy SILT	8
	9							*sl Org*, Nbe	9
	10								10
	11								11
	12								12
	13								13
	14								14
	15								15
	16								16
	17							Gy Sandy SILT	17
	18							Nbe	18
	19							Gy Poorly-graded GRAVEL	19
	20							w/ Silt & Sand	20
								wet, Nbe	
								BOH	

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-43
Project Number	AKSAS 61478	Total Depth	18.5 feet
		Dates Drilled	4/1/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 25 deg F, 15-20 mph wind, S
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55314, W163.04025
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
0							ORG MAT
1	SPT	06-6032	24 / 42 / 36 / 39				Bn SILT *hi Org*, Vs
2							SAMPLE 06-6032: 75.2% -200, NM 176.6%, ORG 27.7%
3							
4							
5							
6							
7	SPT	06-6033	10 / 30 / 32				
8							SAMPLE 06-6033: NM 57.4%, ORG 26.5%
9							Gy SILT *sl Org*, Nbe
10							
11							
12	SPT	06-6034	24 / 35 / 32				
13							SAMPLE 06-6034: NM 46.4%, ORG 4.5%
14							
15							
16							
17	SPT	06-6035	22 / 40 / 32/3"				Gy Sandy SILT Nbe, to Vr
18							BOH SAMPLE 06-6035: ML, SANDY SILT , 59.6% -200, NM 26.7%, NV, NP Gy Silty GRAVEL w/ Sand

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-44
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/1/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55239, W163.0406
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT *hi Org*, Vs
	2							
	3							
	4							
	5							
	6							Bn-Gy SILT *Org*, Vs
	7							
	8							Gy SILT *sl Org*, Nbe
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							Gy SILT w/ Sand Nbe
	17							
	18							Gy Silty GRAVEL w/ Sand wet, Nbe
	19							
	20							
	21							
	22							BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-45
Project Number	AKSAS 61478	Total Depth	14 feet
		Dates Drilled	4/2/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55152, W163.04045
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1	SPT	06-6036	22				Bn SILT
	2			32				*hi Org*, Vs
	3			39				SAMPLE 06-6036: 47.5% -200, ORG 46.0%
	4			36				
	5							
	6							
	7							
	8	SPT	06-6037	15				SAMPLE 06-6037: NM 153.8%, ORG 29.5%
	9		06-6038	15				Gy SILT
	10			20				*sl Org*, Nbe, to minor Vx. Trace fine sand below 12 ft.
	11			22				SAMPLE 06-6038: NM 38.5%, ORG 3.1%
	12							
	13	SPT	06-6039	16				Gy SILT
	14			26				w/ Sand
				30				Nbe, to Vr
				30			BOH	SAMPLE 06-6039: ML, SILT with SAND , 74.5% -200, NM 37.6%, NV, NP

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-46
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/2/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55068, W163.04071
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | N-Value

Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth in (Feet)	
0	ORG MAT
1	PEAT w/ Silt Vs
2	
3	Bn SILT *hi Org*, Vs
4	Bn SILT *Org*, Vs
5	
6	
7	
8	Gy SILT Nbe
9	
10	
11	
12	
13	
14	
15	Gy Sandy SILT Nbe
16	
17	Gy Poorly-graded GRAVEL w/ Silt & Sand wet, Nbe
18	
19	
20	
21	
22	BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-47
Project Number	AKSAS 61478	Total Depth	24 feet
		Dates Drilled	4/2/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
Station, Offset		Latitude, Longitude	N67.54907, W163.04111
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0								0
	1	SPT	06-6040	30				ORG MAT	1
	2			41				SAMPLE 06-6040: NM 143.7%, ORG 28.2%	2
	3			52				Bn SILT	3
	4			56				*hi Org*, Vs	4
	5								5
	6								6
	7								7
	8	SPT	06-6041	20				Gy SILT	8
	9			20				*Org*, Vs	9
	10			32				SAMPLE 06-6041: NM 76.4%	10
	11			36					11
	12								12
	13	SPT	06-6042	10				ICE	13
	14			31				w/ Silt	14
	15			36				*Org*	15
	16			41				SAMPLE 06-6042: NM 128.7%, ORG 8.8%	16
	17								17
	18	SPT		5					18
	19			25					19
	20			34					20
	21			38				Gy SILT	21
	22							Vs	22
	23							Gy SILT	23
	24							w/ Sand	24
								Nbe	
								Gy Sandy SILT	
								w/ Gravel	
								BOH wet, Nbe	

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-48
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/2/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54743, W163.04139
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log
S-S Auger	0–22	AUGER	06-6044					

SUBSURFACE MATERIAL

0 ORG MAT
Bn SILT
hi Org, Vs

6 Bn-Gy SILT
Org, Vs

9 Gy-Bn SILT
sl Org, Nbe

21 Gy SILT
w/ Sand
Nbe

22 BOH
Gy Silty GRAVEL
w/ Sand
Nbe
SAMPLE 06-6044: GM, SILTY GRAVEL with SAND , 12.3% -200, NM 10.6%, NV, NP

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-49
Project Number	AKSAS 61478	Total Depth	14 feet
		Dates Drilled	4/2/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54574, W163.04157
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0							ORG MAT	0
	1	SPT	06-6045	16				Bn SILT	1
	2			29				*hi Org*, Vs	2
	3			38				SAMPLE 06-6045: NM 200.0%, ORG 42.6%	3
	4			42				ICE	4
	5							w/ Silt	5
	6							*Org*	6
	7							Bn-Gy SILT	7
	8	SPT	06-6046	5				*Org*, Vs	8
	9			24				SAMPLE 06-6046: NM 96.1%, ORG 12.0%	9
	10			32				Bn-Gy SILT	10
	11			35				*sl Org*, Vs	11
	12								12
	13	SPT	06-6047	25				SAMPLE 06-6047: NM 34.5%, ORG 3.2%	13
	14			41				BOH	14
				45					
				50					

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

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Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-50
Project Number	AKSAS 61478	Total Depth	24.5 feet
		Dates Drilled	4/2/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, lite snow and wind, 15 deg F
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54496, W163.04167
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway alignment

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | N-Value

Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	PEAT
2	w/ Silt
	Vs
3	Bn SILT
	hi Org, Vs
10	Bn-Gy SILT
	Org, Vs
15	Gy SILT
	sl Org, Nbe
24	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

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Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-51
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/3/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 5-10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.5504, W163.04825
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6048					ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs
	3							SAMPLE 06-6048: NM 247.3%, ORG 23.7%
	4							
	5							
	6							
	7							
	8							Gy SILT
	9	AUGER	06-6049					*Org*, Vs
	10							SAMPLE 06-6049: NM 86.9%, ORG 9.6%
	11							
	12							
	13							
	14							
	15							Gy SILT
	16							*sl Org*, Nbe, to Vs
	17							
	18							
	19							
	20							
	21							Gy SILT
	22							w/ Sand
								BOH Nbe

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-52
Project Number	AKSAS 61478	Total Depth	14 feet
		Dates Drilled	4/3/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 5-10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.5525, W163.04797
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1	SPT	06-6050	8, 25				Bn SILT
	2			30, 40				*hi Org*, Vs
	3							SAMPLE 06-6050: ML, SILT with SAND , 84.3% -200, NM 119.7%, NV, NP
	4							
	5							Bn SILT
	6							*Org*, Vs
	7	SPT	06-6051	10				
	8			40, 50				SAMPLE 06-6051: NM 65.8%
	9			65				
	10							Gy SILT
	11							*sl Org*, Vs
	12			12				
	13	SPT	06-6052	31, 42				SAMPLE 06-6052: NM 58.9%
	14			35/3"				BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-53
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/3/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 5-10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55417, W163.04751
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6053					ORG MAT
	1							ICE
	2							w/ Silt
	3							*Org*
	4							Bn SILT
	5							*hi Org*
	6							SAMPLE 06-6053: NM 138.6%, ORG 19.1%
	7							Bn-Gy SILT
	8							*Org*, Vs
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							Gy SILT
	19							w/ Sand
	20	AUGER	06-6054					Nbe
	21							Gy Well-graded SAND
	22							w/ Silt & Gravel
								wet, Nbe
								SAMPLE 06-6054: SW-SM, WELL-GRADED SAND with SILT and GRAVEL
								, 8.6% -200, NM 9.2%, NV, NP
								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-54
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/3/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 5-10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55574, W163.04707
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method: S-S Auger

Sample Data: Method, Number, Blow Count, N-Value, Frozen, Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Method	Number	Material
0			ORG MAT
1	AUGER	06-6055	ICE
2			w/ Silt
2			*Org*
3			Bn-Gy SILT
3			*hi Org*, Vs
4			SAMPLE 06-6055: NM 227.1%, ORG 32.3%
9	AUGER	06-6056	SAMPLE 06-6056: NM 113.3%, ORG 19.8%
12			Gy SILT
12			Vs, Nbe
18			Gy SILT
18			w/ Sand
18			Nbe
20			Gy Silty GRAVEL
20			w/ Sand
20			Nbe
22			BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-55
Project Number	AKSAS 61478	Total Depth	17.5 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
Station, Offset			
Latitude, Longitude	N67.55759, W163.04665		
Elevation			

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								PEAT Vr
	2								ICE trace silt, org
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								ICE w/ Silt
	11								
	12								
	13								ICE
	14								
	15								ICE w/ Silt
	16								
	17								BOH Gy SILT Vs

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-56
Project Number	AKSAS 61478	Total Depth	21 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55891, W163.04638
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT Vr
	1							
	2							ICE
	3							
	4							
	5							
	6							
	7							
	8							Bn SILT *hi Org*, Vs
	9							
	10							
	11							
	12							
	13							Bn PEAT w/ Silt Vs
	14							
	15							
	16							Gy SILT w/ Sand *sl Org*, Vx
	17							
	18							Gy Sandy SILT w/ Gravel wet, Nbe
	19							
	20							
	21							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-57
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56023, W163.04614
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT *hi Org*, Vs
	2							
	3							
	4	AUGER	06-6057					SAMPLE 06-6057: NM 224.3%, ORG 24.5%
	5							
	6							
	7							
	8							
	9							
	10							
	11	AUGER	06-6058					SAMPLE 06-6058: NM 133.2%, ORG 20.6%
	12							Gy SILT *Org*, Vs
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							Gy Sandy SILT w/ Gravel wet, Nbe
	21							
	22							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-58
Project Number	AKSAS 61478	Total Depth	14 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56131, W163.0459
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0							ORG MAT	0
	1			3				Bn SILT	1
	2	SPT	06-6059	25				*hi Org*, Vs	2
	3			30				SAMPLE 06-6059: NM 406.2%, ORG 46.2%	3
	4			30					4
	5								5
	6								6
	7								7
	8			6					8
	9	SPT	06-6060	35				SAMPLE 06-6060: NM 239.2%, ORG 41.3%	9
	10			32					10
	11			35					11
	12								12
	13	SPT		16					13
	14			28				Gy SILT	14
				32				*sl Org*, Vs	
				36				BOH	

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-59
Project Number	AKSAS 61478	Total Depth	24 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
Station, Offset			
Latitude, Longitude	N67.56207, W163.04568		
Elevation			

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 runway

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 06-6061; Blow Count; N-Value; Frozen; Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	Bn SILT
2	*hi Org*, Vs
	SAMPLE 06-6061: NM 490.5%
12	Gy SILT
13	Vs
15	Gy SILT
16	w/ Sand
17	Nbe
18	Gy Silty SAND
19	Nbe
24	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammar ☐ Cathead Rope Method

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Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-60
Project Number	AKSAS 61478	Total Depth	24 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56113, W163.04404
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 taxiway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6062					ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs
	3							SAMPLE 06-6062: NM 147.3%
	4							ICE
	5							w/ Silt
	6							
	7							
	8							
	9							
	10							SILT
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							Gy SILT
	21							w/ Sand
	22							Vs
	23							Gy Silty GRAVEL
	24							w/ Sand
								Nbe
								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-61
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
Station, Offset		Latitude, Longitude	N67.56136, W163.0422
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 taxiway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								Bn SILT *hi Org*, Vs
	2								
	3								ICE *hi Org*
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								ICE w/ Silt *Org*
	13								
	14								ICE
	15								
	16								Gy SILT Vs
	17								
	18								
	19								
	20								Gy Sandy SILT
	21								
	22								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

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Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-62
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/4/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56144, W163.03993
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 3 apron

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0								ORG MAT	0
	1								Bn SILT *hi Org*, Vs	1
	2									2
	3									3
	4								ICE w/ Silt *Org*	4
	5									5
	6									6
	7									7
	8									8
	9									9
	10								Gy SILT Vs, to Nbe	10
	11									11
	12									12
	13									13
	14									14
	15									15
	16									16
	17									17
	18									18
	19									19
	20								Gy Sandy SILT Nbe	20
	21									21
	22								BOH	22

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-63
Project Number	AKSAS 61478	Total Depth	24 feet
		Dates Drilled	4/5/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55733, W163.03332
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 apron

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								Bn-Gy SILT *hi Org*, Vs
	2								
	3								
	4								
	5								
	6								
	7								Gy SILT *Org*, Vs
	8								
	9								
	10								
	11								
	12								Gy-Bn SILT *sl Org*, Nbe, to minor Vs
	13								
	14								
	15								
	16								
	17								
	18								
	19								Gy SILT w/ Sand Nbe
	20								
	21								
	22								Gy Silty SAND Nbe
	23								
	24								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-64
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/5/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55662, W163.0334
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 apron

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | N-Value

Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	Bn SILT
2	*hi Org*, Vs
3	
4	Bn-Gy SILT
5	*Org*, Vs
6	
7	
8	Gy SILT
9	Nbe
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	Gy SILT
21	w/ Sand
22	Nbe
	BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-65
Project Number	AKSAS 61478	Total Depth	21 feet
		Dates Drilled	4/5/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Spruce trees and tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55613, W163.03351
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 apron, in trees

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn-Gy SILT *hi Org*, Vs
	2							
	3							
	4							
	5							
	6							
	7							Gy SILT Vs
	8							
	9							
	10							
	11							
	12							
	13							
	14							Gy SILT w/ Sand Nbe
	15							
	16							Gy Sandy SILT w/ Gravel Nbe
	17							
	18							Gy Poorly-graded GRAVEL w/ Silt & Sand wet, Nbe, to Vr
	19							
	20							
	21							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-66
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/7/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.5594, W163.03907
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway

Drilling Method: S-S Auger

Sample Data: Method, Number, Blow Count, N-Value

Frozen

Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Method	Number	Description
0			ORG MAT
1	AUGER	06-6063	PEAT w/ Silt Vs
2			SAMPLE 06-6063: NM 715.4%, ORG 67.2%
3			Bn SILT *hi Org*, Vs
4			
5	AUGER	06-6064	Gy SILT *sl Org*, Vs
6			SAMPLE 06-6064: NM 105.5%
7			Gy SILT Nbe
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			Gy SILT w/ Sand Nbe
18			
19			Gy Silty GRAVEL w/ Sand Nbe
20			
21			
22			BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-67
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/7/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
		Station, Offset	
Field Crew	S. PARKER, J. CLINE	Weather	Clear, -10 to 5 deg F, 5 mph wind
		Latitude, Longitude	N67.55819, W163.03935
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT
	2	AUGER	06-6065					*hi Org*, Vs
	3							SAMPLE 06-6065: NM 120.8%, ORG 27.9%
	4							
	5							
	6							
	7	AUGER	06-6066					SAMPLE 06-6066: NM 211.8%, ORG 29.4%
	8							
	9							Gy SILT
	10							*sl Org*, Nbe
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							Gy SILT
	21							w/ Sand
	22							Nbe
							BOH	Gy Silty GRAVEL
								w/ Sand
								Nbe

Note: Unless otherwise noted, all samples ere taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-68
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/7/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55788, W163.03649
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 taxiway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6067					ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs
	3							SAMPLE 06-6067: NM 234.7%, ORG 32.9%
	4							
	5							
	6	AUGER	06-6068					
	7							SAMPLE 06-6068: NM 174.3%, ORG 15.1%
	8							Gy SILT
	9							*sl Org*, Vs
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							Gy SILT
	19							w/ Sand
	20	AUGER	06-6069					Nbe
	21							Gy Silty GRAVEL
	22							w/ Sand
								Nbe
								SAMPLE 06-6069: GM, SILTY GRAVEL with SAND , 17.4% -200, NM 10.2%, NV, NP
								BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-69
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/7/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55791, W163.03326
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 apron

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1	SPT	06-6070	25				Bn SILT
	2			50				*hi Org*, Vs
	3			48				SAMPLE 06-6070: NM 293.9%, ORG 46.1%
	4			30/3"				
	5	SPT	06-6071	10				SAMPLE 06-6071: NM 141.2%, ORG 7.4%
	6			30				
	7			42				
	8			45				
	9	SPT	06-6072	17				Gy SILT
	10			32				w/ Sand
	11			42				*sl Org*, Nbe
	12			35				SAMPLE 06-6072: ML, SILT with SAND , 71.6% -200, NM 45.5%, NV, NP
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							Gy Sandy SILT
	21							w/ Gravel
	22							Nbe
							BOH	Gy Silty GRAVEL
								w/ Sand
								Nbe

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-70
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	4/7/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 10 deg F, 5 mph wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55763, W163.0319
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 apron

Drilling Method: S-S Auger

Sample Data: Depth in (Feet) | Method | Number | Blow Count | N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

- 0 – ORG MAT
- 1 – SILT
  hi Org, Vs
- 2 – SAMPLE 06-6073: NM 350.9%, ORG 25.4%
- 3 – Bn SILT
  Org, Vs
- 4
- 5 – SAMPLE 06-6074: NM 58.3%, ORG 7.3%
- 6 – ICE
  w/ Silt
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22 – BOH

AUGER 06-6073

AUGER 06-6074

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-74
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/12/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 25 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56028, W163.0388
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								Bn SILT *hi Org*, Vs
	2								
	3								
	4								
	5								Gy SILT *sl Org*, Vs
	6								
	7								
	8								
	9								
	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								Gy SILT w/ Sand Nbe
	18								
	19								Gy Silty GRAVEL w/ Sand Nbe, to Vx
	20								
	21								
	22								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-75
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/12/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 25 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55749, W163.03951
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1	AUGER	06-6090					Bn SILT
	2							*hi Org*, Vs
	3							SAMPLE 06-6090: NM 418.6%, ORG 58.0%
	4							
	5							
	6	AUGER	06-6091					SAMPLE 06-6091: NM 208.6%, ORG 19.1%
	7							
	8							Gy SILT
	9							*Org*, Vs
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							Gy SILT
	20							w/ Sand
	21							Nbe
	22							Gy Silty GRAVEL
								w/ Sand
							BOH	Nbe

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-76
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	4/12/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 25 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55808, W163.03092
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Alternative 1 apron to access road

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 06-6092; Blow Count; N-Value

Frozen

Graphic Log

SUBSURFACE MATERIAL

- 0 – ORG MAT
- 1 – SILT
  hi Org, Vs
- 2 – Bn-Gy SILT
  sl Org, Nbn
  SAMPLE 06-6092: NM 47.7%, ORG 3.8%
- 14 – ICE
- 22 – BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS_NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-77
Project Number	AKSAS 61478	Total Depth	17 feet
		Dates Drilled	4/12/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 25 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55785, W163.02877
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, west of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								Bn SILT
	2								*hi Org*, Vs
	3								Bn-Gy SILT
	4								*Org*, Vs
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								Gy SILT
	13								*sl Org*, Vs
	14								
	15								
	16								
	17								BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-78
Project Number	AKSAS 61478	Total Depth	17 feet
		Dates Drilled	4/12/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 25 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
Station, Offset			
Latitude, Longitude	N67.55697, W163.02622		
Elevation			

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, west of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT
	1								Bn SILT
	2	AUGER	06-6093						*hi Org*, Vs
	3								SAMPLE 06-6093: NM 148.9%, ORG 25.0%
	4								
	5								
	6								
	7	AUGER	06-6094						SAMPLE 06-6094: NM 232.7%, ORG 23.5%
	8								Gy SILT
	9								*Org*, Vs
	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-79
Project Number	AKSAS 61478	Total Depth	12 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55612, W163.01999
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log
S-S Auger	0	AUGER	06-6095				
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						

SUBSURFACE MATERIAL

0 ORG MAT
1 Bn SILT
2 *Org*, Vs
SAMPLE 06-6095: NM 203.0%, ORG 13.3%
12 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-80
Project Number	AKSAS 61478	Total Depth	12 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55681, W163.01843
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6096					ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs
	3							
	4							
	5							SAMPLE 06-6096: NM 259.0%, ORG 31.6%
	6							
	7							
	8							
	9							
	10							
	11							
	12							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-81
Project Number	AKSAS 61478	Total Depth	12 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55814, W163.01532
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							PEAT
	2							Ice + ...
	3							Bn SILT
	4							*Org*, Vs
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-82
Project Number	AKSAS 61478	Total Depth	21 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
Station, Offset			
Latitude, Longitude	N67.55892, W163.01175		
Elevation			

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek, at small drainage

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0								0
	1	AUGER	06-6097					Bn ICE	1
	2							w/ Silt & Sand	2
	3							*hi Org*	3
	4							SAMPLE 06-6097: SM, SILTY SAND , 29.8% -200, NM 1150.3%, ORG 66.4%, NV, NP	4
	5							Bn SILT	5
	6							*hi Org*, Vs	6
	7								7
	8								8
	9							Gy-Bn SILT	9
	10							*Org*, Vs	10
	11								11
	12								12
	13								13
	14							Gy Silty SAND	14
	15							Vr	15
	16								16
	17							Gy Poorly-graded GRAVEL	17
	18							w/ Silt & Sand	18
	19							wet, Vr	19
	20	AUGER	06-6098					SAMPLE 06-6098: GP-GM, POORLY GRADED GRAVEL with SILT and SAND , 7.3% -200, NV, NP	20
	21							BOH	21

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-83
Project Number	AKSAS 61478	Total Depth	18 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.55914, W163.01103
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs
	3							
	4							
	5							
	6							
	7							
	8							Gy-Bn SILT
	9							*Org*, Vs
	10							
	11							
	12							
	13							
	14							
	15							Gy Silty SAND
	16							w/ Gravel
	17							Nbe
	18							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-84
Project Number	AKSAS 61478	Total Depth	12 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
Station, Offset			
Latitude, Longitude	N67.55998, W163.00745		
Elevation			

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6099					ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs
	3							SAMPLE 06-6099: NM 258.1%, ORG 48.0%
	4							Bn SILT
	5							*Org*, Vs
	6							
	7							
	8							
	9							
	10							
	11							
	12							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-85
Project Number	AKSAS 61478	Total Depth	12 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 15 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56099, W163.00346
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT
	2							*hi Org*, Vs, numerous peat layers
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-86
Project Number	AKSAS 61478	Total Depth	12 feet
		Dates Drilled	4/15/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Sunny, 20 deg F, calm
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56212, W162.99963
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Access road, east of creek

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn SILT *hi Org*, Vs
	2							
	3							
	4							Bn SILT *Org*, Vs
	5							
	6							
	7							
	8							Gy SILT *sl Org*, Vs
	9							
	10							
	11							
	12							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-100
Project Number	AKSAS 61478	Total Depth	10.5 feet
		Dates Drilled	9/28/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 45 deg F
TH Finalized By	J. ROWLAND	Vegetation	None
		Station, Offset	
		Latitude, Longitude	N67.56548, W162.97382
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Apron of existing airport, southwest corner

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0	SS	06-6300	1, 2, 4	6			Bn-Gy Well-graded GRAVEL w/ Silt & Sand (fill) loose
	1			6				SAMPLE 06-6300: GW-GM, WELL-GRADED GRAVEL with SILT and SAND , 6.8% -200, NM 3.1%, NV, NP
	2							
	3							
	4	SPT		3, 5, 4, 6	9			Bn-Gy Poorly-graded GRAVEL w/ Sand (fill) moist to wet, loose
	5							
	6							
	7	AUGER	06-6301					SAMPLE 06-6301: GP, POORLY GRADED GRAVEL with SAND , 4% -200, NV, NP
	8							
	9	SS	06-6302	3				Bn SILT wet, loose, *hi Org*, Vr SAMPLE 06-6302: NM 94.2%, ORG 29.4%
	10		06-6303	12, 17, 21				BOH SAMPLE 06-6303: NM 312.6%, ORG 32.0%

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/25/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-101
Project Number	AKSAS 61478	Total Depth	13.5 feet
		Dates Drilled	9/28/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 45 deg F
TH Finalized By	J. ROWLAND	Vegetation	None
		Station, Offset	
		Latitude, Longitude	N67.56735, W162.97374
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
North end of existing runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log
S-S Auger	0–13	AUGER	06-6304				

SUBSURFACE MATERIAL

Gy Well-graded SAND
w/ Gravel (fill)

Bn-Gy Well-graded GRAVEL
w/ Silt & Sand (fill)
moist to wet
SAMPLE 06-6304: GW-GM, WELL-GRADED GRAVEL with SILT and SAND
, 5.1% -200, SSc 0.3, SSf 2.0, LA 22, DEG 84, NV, NP

Bn-Gy SILT
hi Org, Vr

BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/25/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-102
Project Number	AKSAS 61478	Total Depth	13 feet
		Dates Drilled	9/28/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 45 deg F
TH Finalized By	J. ROWLAND	Vegetation	None
		Station, Offset	
		Latitude, Longitude	
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
North end of existing runway, east shoulder

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							Gy Well-graded SAND w/ Gravel (fill) loose
	1							
	2							Gy-Bn Well-graded GRAVEL w/ Silt & Sand (fill) moist, loose
	3							
	4							
	5							
	6							
	7							Bn-Gy Well-graded GRAVEL w/ Silt & Sand (fill) wet, old airport embankment, siltier than upper layer
	8							
	9							
	10							Bn-Gy SILT wet, *hi Org*
	11							
	12							
	13							BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/25/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-103
Project Number	AKSAS 61478	Total Depth	10 feet
		Dates Drilled	9/28/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 45 deg F
TH Finalized By	J. ROWLAND	Vegetation	None
		Station, Offset	
		Latitude, Longitude	
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
North end of existing runway

Drilling Method	Depth in (Feet)	Sample Data: Method	Sample Data: Number	Sample Data: Blow Count	Sample Data: N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6305					Gy Well-graded SAND w/ Gravel (fill) moist
	1							
	2							Bn-Gy Well-graded GRAVEL w/ Silt & Sand (fill) moist to wet
	3							
	4							SAMPLE 06-6305: NM 3.9%
	5							
	6							
	7							
	8							Bn SILT
	9							wet, *Org*, ice content not observed (no returns)
	10							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/25/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-104
Project Number	AKSAS 61478	Total Depth	13 feet
		Dates Drilled	9/28/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 45 deg F
TH Finalized By	J. ROWLAND	Vegetation	None
		Station, Offset	
		Latitude, Longitude	
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Approx. station 147+00, 10 ft left

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6307					Gy-Bn Well-graded SAND w/ Gravel (fill) moist
	1							
	2							Bn-Gy Poorly-graded GRAVEL w/ Silt & Sand (fill) moist to wet, Fill is more compact here (1992 construction)
	3							
	4							SAMPLE 06-6307: GP-GM, POORLY GRADED GRAVEL with SILT and SAND , 8% -200, NV, NP
	5							
	6							
	7							
	8							
	9							
	10	AUGER	06-6308					SAMPLE 06-6308: GP-GM, POORLY GRADED GRAVEL with SILT and SAND , 10.5% -200, NM 4.1%, ORG 1.8%, NV, NP
	11							Bn-Gy SILT wet, *hi Org*
	12							
	13							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/25/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-105
Project Number	AKSAS 61478	Total Depth	13 feet
		Dates Drilled	9/28/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Cloudy, 45 deg F
TH Finalized By	J. ROWLAND	Vegetation	None
		Station, Offset	
		Latitude, Longitude	
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
South end of runway, approx. station 156+80

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0	AUGER	06-6309					Gy-Bn Poorly-graded GRAVEL
	1							w/ Silt & Sand (fill)
	2							moist to wet, siltier below 5 feet. Black geotextile sheet at base of fill.
	3							SAMPLE 06-6309: GP-GM, POORLY GRADED GRAVEL with SILT and
	4							SAND , 7.1% -200, NM 3.7%, NV, NP
	5							
	6							
	7							
	8							Bn-Gy SILT
	9							wet, *hi Org*, (poor returns)
	10							
	11							
	12							
	13							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/25/07

Appendix D

Laboratory test results

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE:

TEST HOLE NUMBER		06-26	06-26	06-28	06-28	06-28	06-29	06-30
DEPTH (feet)		3-4	19-22	1-2	6-7	19-20	4-5	1-2
LATITUDE		N67.55384	N67.55384	N67.54821	N67.54821	N67.54821	N67.54659	N67.54413
LONGITUDE		W163.04016	W163.04016	W163.04124	W163.04124	W163.04124	W163.04142	W163.04181
LAB NUMBER		06-6010	06-6011	06-6012	06-6013	06-6014	06-6015	06-6016
DATE SAMPLED		30-Mar-06	30-Mar-06	30-Mar-06	30-Mar-06	30-Mar-06	30-Mar-06	30-Mar-06
% Passing	**3"**							
	2"							
	1.5"		100					
Gravel	**1.0"**		99					
	0.75"		95					
	0.5"		81					
	0.375"		72					
	#4		48					100
	#8		32					97
	#10		30					95
	#16		24			100		88
	#30		20			99		75
Sand	**#40**		18			99		70
	#50		15			97		65
	#60		13			94		63
	#80		11			85		59
	#100		10			79		57
Silt/Clay	**#200**		7.9			47.9		52.3
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT			NV			NV		NV
PLASTIC INDEX			NP			NP		NP
USCS CLASSIFICATION			GP-GM			SM		ML
AK DOT SOIL DESCR.								
NATURAL MOISTURE		61.5		157.4	285.8	28.2	173.6	238.1
ORGANICS		5.5		32.0	27.3		10.9	40.7
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE:

TEST HOLE NUMBER		06-30	06-31	06-31	06-32	06-32	06-34	06-35
DEPTH (feet)		9-10	1-2	15-17	1-2	22-24	6-7	7-8
LATITUDE		N67.54413	N67.54562	N67.54562	N67.54715	N67.54715	N67.55162	N67.55476
LONGITUDE		W163.04181	W163.04895	W163.04895	W163.04935	W163.04935	W163.04883	W163.04869
LAB NUMBER		06-6017	06-6018	06-6019	06-6020	06-6021	06-6022	06-6023
DATE SAMPLED		30-Mar-06	31-Mar-06	31-Mar-06	31-Mar-06	31-Mar-06	31-Mar-06	31-Mar-06
% Passing	**3"**							
	2"							
	1.5"					100		
Gravel	**1.0"**					97		
	0.75"					94		
	0.5"					83		
	0.375"					72		
	#4					49		
	#8					36		
	#10					34		
	#16					30		
	#30					27		
Sand	**#40**					25		
	#50					23		
	#60					22		
	#80					19		
	#100					18		
Silt/Clay	**#200**					14.6		
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT						NV		
PLASTIC INDEX						NP		
USCS CLASSIFICATION						GM		
AK DOT SOIL DESCR.								
NATURAL MOISTURE			350.2	41.6	691.3	8.3	186.8	83.1
ORGANICS		14.8	54.4		72.9			
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE:

TEST HOLE NUMBER		06-40	06-40	06-40	06-40	06-41	06-41	06-41
DEPTH (feet)		2-2.5	8-9	13-13.5	17.5-18	5-6	14-15	19-25
LATITUDE		N67.5567	N67.5567	N67.5567	N67.5567	N67.5555	N67.5555	N67.5555
LONGITUDE		W163.03977	W163.03977	W163.03977	W163.03977	W163.03999	W163.03999	W163.03999
LAB NUMBER		06-6024	06-6025	06-6026	06-6027	06-6028	06-6029	06-6030
DATE SAMPLED		1-Apr-06	1-Apr-06	1-Apr-06	1-Apr-06	1-Apr-06	1-Apr-06	1-Apr-06
% Passing	**3"**							
	2"							
	1.5"							100
Gravel	**1.0"**							99
	0.75"							98
	0.5"							92
	0.375"							84
	#4							53
	#8							30
	#10							29
	#16							23
	#30							20
Sand	**#40**				100	100		18
	#50		100		98	99		15
	#60		99		97	99		14
	#80		99		94	97		12
	#100		99		92	96		11
Silt/Clay	**#200**		95.9		78.1	89.8		9.0
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT			NV		NV	NV		NV
PLASTIC INDEX			NP		NP	NP		NP
USCS CLASSIFICATION			ML		ML	ML		GP-GM
AK DOT SOIL DESCR.								
NATURAL MOISTURE		337.2	56.3	37.6	37.5	45.5	37.3	9.7
ORGANICS		39.4		3.0			3.7	
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								21
DEGRAD. FACTOR								84
SODIUM SULF. (CRSE)								0.5
SODIUM SULF. (FINE)								0.8
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-43	06-43	06-43	06-43	06-45	06-45	06-45
DEPTH (feet)		0.5-2.5	7.5-8	12.5-13	17-18	0.5-2.5	7.5-8	8-8.5
LATITUDE		N67.55314	N67.55314	N67.55314	N67.55314	N67.55152	N67.55152	N67.55152
LONGITUDE		W163.04025	W163.04025	W163.04025	W163.04025	W163.04045	W163.04045	W163.04045
LAB NUMBER		06-6032	06-6033	06-6034	06-6035	06-6036	06-6037	06-6038
DATE SAMPLED		1-Apr-06	1-Apr-06	1-Apr-06	1-Apr-06	2-Apr-06	2-Apr-06	2-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4				100	100		
	#8				98	98		
	#10	100			98	97		
	#16	98			98	92		
	#30	93			97	82		
Sand	**#40**	91			97	78		
	#50	89			97	72		
	#60	88			96	67		
	#80	85			94	62		
	#100	82			89	57		
Silt/Clay	**#200**	75.2			59.6	47.5		
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT					NV			
PLASTIC INDEX					NP			
USCS CLASSIFICATION					ML			
AK DOT SOIL DESCR.								
NATURAL MOISTURE		176.6	57.4	46.4	26.7		153.8	38.5
ORGANICS		27.7	26.5	4.5		46.0	29.5	3.1
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-45	06-47	06-47	06-47	06-48	06-49	06-49
DEPTH (feet)		12.5-13	0.5-2.5	8-8.5	12.5-14	21-22	0.5-2.5	7.5-8.5
LATITUDE		N67.55152	N67.54907	N67.54907	N67.54907	N67.54743	N67.54574	N67.54574
LONGITUDE		W163.04045	W163.04111	W163.04111	W163.04111	W163.04139	W163.04157	W163.04157
LAB NUMBER		06-6039	06-6040	06-6041	06-6042	06-6044	06-6045	06-6046
DATE SAMPLED		2-Apr-06	2-Apr-06	2-Apr-06	2-Apr-06	2-Apr-06	2-Apr-06	2-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"					100		
	0.5"					95		
	0.375"					88		
	#4					55		
	#8					36		
	#10					34		
	#16	100				31		
	#30	99				29		
Sand	**#40**	99				27		
	#50	99				24		
	#60	98				22		
	#80	95				18		
	#100	92				17		
Silt/Clay	**#200**	74.5				12.3		
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV				NV		
PLASTIC INDEX		NP				NP		
USCS CLASSIFICATION		ML				GM		
AK DOT SOIL DESCR.								
NATURAL MOISTURE		37.6	143.7	76.4	128.7	10.6	200.0	96.1
ORGANICS			28.2		8.8		42.6	12.0
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-49	06-51	06-51	06-52	06-52	06-52	06-53
DEPTH (feet)		12.5-13	2-2.5	9.5-10	0.5-2.5	7.5-8	13-13.5	4-5
LATITUDE		N67.54574	N67.5504	N67.5504	N67.5525	N67.5525	N67.5525	N67.55417
LONGITUDE		W163.04157	W163.04825	W163.04825	W163.04797	W163.04797	W163.04797	W163.04751
LAB NUMBER		06-6047	06-6048	06-6049	06-6050	06-6051	06-6052	06-6053
DATE SAMPLED		2-Apr-06	3-Apr-06	3-Apr-06	3-Apr-06	3-Apr-06	3-Apr-06	3-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8				100			
	#10				99			
	#16				98			
	#30				96			
Sand	**#40**				95			
	#50				95			
	#60				93			
	#80				92			
	#100							
Silt/Clay	**#200**				84.3			
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT					NV			
PLASTIC INDEX					NP			
USCS CLASSIFICATION					ML			
AK DOT SOIL DESCR.								
NATURAL MOISTURE		34.5	247.3	86.9	119.7	65.8	58.9	138.6
ORGANICS		3.2	23.7	9.6				19.1
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-53	06-54	06-54	06-57	06-57	06-58	06-58
DEPTH (feet)		20-22	1.5-2	9-10	4-5	11-12	1.5-3	8-8.5
LATITUDE		N67.55417	N67.55574	N67.55574	N67.56023	N67.56023	N67.56131	N67.56131
LONGITUDE		W163.04751	W163.04707	W163.04707	W163.04614	W163.04614	W163.0459	W163.0459
LAB NUMBER		06-6054	06-6055	06-6056	06-6057	06-6058	06-6059	06-6060
DATE SAMPLED		3-Apr-06	3-Apr-06	3-Apr-06	4-Apr-06	4-Apr-06	4-Apr-06	4-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**	100						
	0.75"	98						
	0.5"	90						
	0.375"	83						
	#4	57						
	#8	38						
	#10	36						
	#16	29						
	#30	25						
Sand	**#40**	22						
	#50	18						
	#60	16						
	#80	13						
	#100	12						
Silt/Clay	**#200**	8.6						
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV						
PLASTIC INDEX		NP						
USCS CLASSIFICATION		SW-SM						
AK DOT SOIL DESCR.								
NATURAL MOISTURE		9.2	227.1	113.3	224.3	133.2	406.2	239.2
ORGANICS			32.3	19.8	24.5	20.6	46.2	41.3
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-59	06-60	06-66	06-66	06-67	06-67	06-68
DEPTH (feet)		1-2	1.5-2	1.5-2	5.5-6	1.5-2	6-7	2-2.5
LATITUDE		N67.56207	N67.56113	N67.5594	N67.5594	N67.55819	N67.55819	N67.55788
LONGITUDE		W163.04568	W163.04404	W163.03907	W163.03907	W163.03935	W163.03935	W163.03649
LAB NUMBER		06-6061	06-6062	06-6063	06-6064	06-6065	06-6066	06-6067
DATE SAMPLED		4-Apr-06	4-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8							
	#10							
	#16							
	#30							
Sand	**#40**							
	#50							
	#60							
	#80							
	#100							
Silt/Clay	**#200**							
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT								
PLASTIC INDEX								
USCS CLASSIFICATION								
AK DOT SOIL DESCR.								
NATURAL MOISTURE		490.5	147.3	715.4	105.5	120.8	211.8	234.7
ORGANICS				67.2		27.9	29.4	32.9
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-68	06-68	06-69	06-69	06-69	06-70	06-70
DEPTH (feet)		6.5-7	19-22	0.5-2.5	4-6	9-11	1.5-2	4.5-5
LATITUDE		N67.55788	N67.55788	N67.55791	N67.55791	N67.55791	N67.55763	N67.55763
LONGITUDE		W163.03649	W163.03649	W163.03326	W163.03326	W163.03326	W163.0319	W163.0319
LAB NUMBER		06-6068	06-6069	06-6070	06-6071	06-6072	06-6073	06-6074
DATE SAMPLED		7-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06	7-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**		100					
	0.75"		99					
	0.5"		91					
	0.375"		84					
	#4		57					
	#8		39					
	#10		37					
	#16		33					
	#30		30					
Sand	**#40**		28			100		
	#50		26			98		
	#60		24			96		
	#80		22			91		
	#100		21			87		
Silt/Clay	**#200**		17.4			71.6		
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT			NV			NV		
PLASTIC INDEX			NP			NP		
USCS CLASSIFICATION			GM			ML		
AK DOT SOIL DESCR.								
NATURAL MOISTURE		174.3	10.2	293.9	141.2	45.5	350.9	58.3
ORGANICS		15.1		46.1	7.4		25.4	7.3
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-75	06-75	06-76	06-78	06-78	06-79	06-80
DEPTH (feet)		1.5-2	6-6.5	2-2.5	2-2.5	6.5-7	1.5-2	5-5.5
LATITUDE		N67.55749	N67.55749	N67.55808	N67.55697	N67.55697	N67.55612	N67.55681
LONGITUDE		W163.03951	W163.03951	W163.03092	W163.02622	W163.02622	W163.01999	W163.01843
LAB NUMBER		06-6090	06-6091	06-6092	06-6093	06-6094	06-6095	06-6096
DATE SAMPLED		12-Apr-06	12-Apr-06	12-Apr-06	12-Apr-06	12-Apr-06	15-Apr-06	15-Apr-06
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8							
	#10							
	#16							
	#30							
Sand	**#40**							
	#50							
	#60							
	#80							
	#100							
Silt/Clay	**#200**							
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT								
PLASTIC INDEX								
USCS CLASSIFICATION								
AK DOT SOIL DESCR.								
NATURAL MOISTURE		418.6	208.6	47.7	148.9	232.7	203.0	259.0
ORGANICS		58.0	19.1	3.8	25.0	23.5	13.3	31.6
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-82	06-82	06-84				
DEPTH (feet)		1-2	17-21	1-1.5				
LATITUDE		N67.55892	N67.55892	N67.55998				
LONGITUDE		W163.01175	W163.01175	W163.00745				
LAB NUMBER		06-6097	06-6098	06-6099				
DATE SAMPLED		15-Apr-06	15-Apr-06	15-Apr-06				
% Passing	**3"**							
	2"							
	1.5"		100					
Gravel	**1.0"**		98					
	0.75"		95					
	0.5"		84					
	0.375"		75					
	#4	100	49					
	#8	98	32					
	#10	97	30					
	#16	92	25					
	#30	78	21					
Sand	**#40**	72	20					
	#50	64	16					
	#60	59	14					
	#80	50	11					
	#100	44	10					
Silt/Clay	**#200**	29.8	7.3					
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV					
PLASTIC INDEX		NP	NP					
USCS CLASSIFICATION		SM	GP-GM					
AK DOT SOIL DESCR.								
NATURAL MOISTURE		1150.3		258.1				
ORGANICS		66.4		48.0				
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-100	06-100	06-100	06-100	06-101	06-103	06-104
DEPTH (feet)		0-1.5	6-8	8.5-9	10-10.5	1-6	1-8	1-7
LATITUDE		N67.56548	N67.56548	N67.56548	N67.56548	N67.56735		
LONGITUDE		W162.97382	W162.97382	W162.97382	W162.97382	W162.97374		
LAB NUMBER		06-6300	06-6301	06-6302	06-6303	06-6304	06-6305	06-6307
DATE SAMPLED		28-Sep-06	28-Sep-06	28-Sep-06	28-Sep-06	28-Sep-06	28-Sep-06	28-Sep-06
% Passing	**3"**							
	2"		100			100		
	1.5"		98			99		100
Gravel	**1.0"**	100	88			94		95
	0.75"	96	77			88		87
	0.5"	85	57			76		72
	0.375"	70	48			67		63
	#4	49	28			45		42
	#8	34	20			33		30
	#10	32	19			32		29
	#16	26	16			26		24
	#30	20	13			20		20
Sand	**#40**	17	11			16		17
	#50	13	8			12		14
	#60	12	7			10		13
	#80	10	6			8		11
	#100	9	5			7		10
Silt/Clay	**#200**	6.8	4.0			5.1		8.0
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV			NV		NV
PLASTIC INDEX		NP	NP			NP		NP
USCS CLASSIFICATION		GW-GM	GP			GW-GM		GP-GM
AK DOT SOIL DESCR.								
NATURAL MOISTURE		3.1		94.2	312.6		3.9	
ORGANICS				29.4	32.0			
SP. GR. (FINE)								2.69
SP. GR. (COARSE)								2.70
MAX. DRY DENSITY								144.7
OPTIMUM MOISTURE								4.8
L.A. ABRASION						22		
DEGRAD. FACTOR						84		
SODIUM SULF. (CRSE)						0.3		
SODIUM SULF. (FINE)						2.0		
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

State of Alaska Dept. of Transportation Northern Region Materials Lab.

COMPACTION REPORT

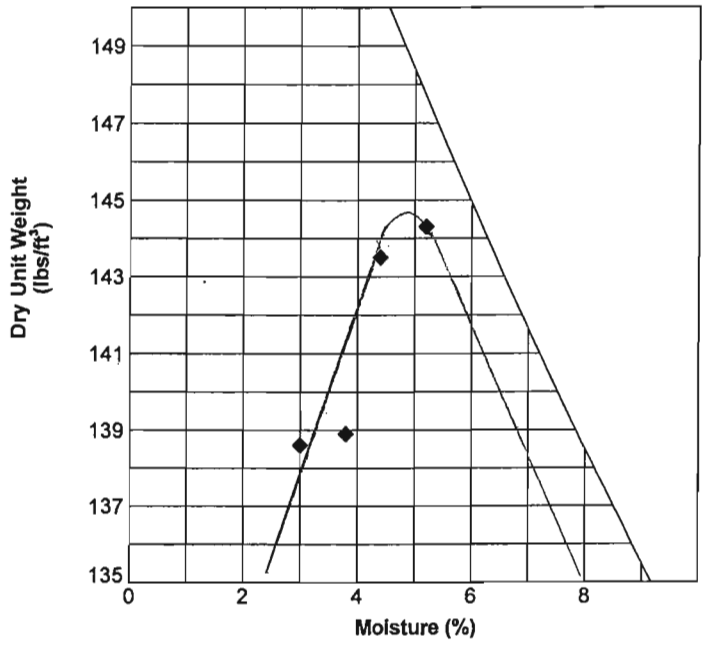
Lab Number: **06-6307**

Project: NOATAK AIRPORT RELOCATION

Field Number:

Source:

MOISTURE / DENSITY RELATIONSHIP



NOTE: The upper right portion of the graph may be clipped at the ZAV.

Dry Unit Wt	1	2	3	4	5	6
lbs/ft³	143.5	138.6	138.9	144.3		
kg/m³	2299	2220	2225	2311		
% Moisture	4.4	3.0	3.8	5.2		

Bleed

REMARKS:

ASTM D-1557 AASHTO T-180D	Regional Lab. lbs/ft³	Regional Lab. kg/m³	Field
Max. Density	144.7		
Opt. Moisture	4.8		

Acceptance/Assurance Comparison

Acceptable	Unacceptable

Signature: _____
Materials Engineer / Designee

Date: _____

Signature: _____
Tonya Knopke
Regional Lab Supervisor

Date: 11/17/06

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: CENTERLINE

TEST HOLE NUMBER		06-104	06-105					
DEPTH (feet)		10-11	1-7					
LATITUDE								
LONGITUDE								
LAB NUMBER		06-6308	06-6309					
DATE SAMPLED		28-Sep-06	28-Sep-06					
% Passing	**3"**							
	2"		100					
	1.5"		99					
Gravel	**1.0"**	100	93					
	0.75"	95	85					
	0.5"	77	69					
	0.375"	66	59					
	#4	45	39					
	#8	32	29					
	#10	31	28					
	#16	26	24					
	#30	22	20					
Sand	**#40**	20	17					
	#50	17	13					
	#60	16	12					
	#80	14	10					
	#100	13	9					
Silt/Clay	**#200**	10.5	7.1					
Hydro	**0.02**							
	0.005							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV					
PLASTIC INDEX		NP	NP					
USCS CLASSIFICATION		GP-GM	GP-GM					
AK DOT SOIL DESCR.								
NATURAL MOISTURE		4.1	3.7					
ORGANICS		1.8						
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

Appendix E

Thermal modeling summary

Thermal modeling

Summary

Modeling of the proposed runway at Noatak was conducted using GEO-SLOPE TEMP/W, a two-dimensional finite element program. The purpose of the modeling was to determine the optimum embankment configuration, under which the least amount of thaw is predicted. The model results indicate that no thaw will occur below the centerline of a 14-ft high embankment, or below the centerline of an 8-ft high embankment with 4 in. insulation placed either at the ground surface or at 2 ft above the ground surface within the embankment. The model results indicate that in the latter configuration, the portion of the embankment below the insulation will freeze within 10 years after construction. A comparison of embankments with 4:1 foreslopes and 2:1 foreslopes indicates that use of 2:1 foreslopes results in less thaw at the toe. For all embankment configurations, at least 4.6 ft of thaw will occur below the toe. Based on this analysis, expect longitudinal cracking along the embankment foreslopes, the development of thaw ponds along the toe, and general settlement of the foreslopes. Consider the placement of thermal berms to move this thawing away from the structural embankment.

Input parameters

The modeled embankment parameters were chosen to simulate sandy gravel at optimum moisture content. The foundation soils were modeled to represent the soils typically seen during the 2006 geotechnical investigation, i.e., silt with 50% visible ice. It was assumed that, in the undisturbed areas adjacent to the embankment, a 1-ft thick organic mat covered the foundation soils. Additionally, it was assumed that the embankment compressed the organic mat directly below it, effectively eliminating the mat's insulating properties. Using this conservative approach, only foundation soils were included directly under the embankment in the model, simulating a "compressed" organic mat. The finite element mesh was extended at least 14 ft horizontally from the toe of the embankment, and at least 25 ft below the ground surface, in order to determine what the model predicted for the natural active layer depth and temperatures at depth.

The physical and thermal properties of each of the material types used in the model are listed in Table 1. The gravimetric moisture content is that determined by weight analysis (i.e., this is the moisture content reported from the typical laboratory test). The volumetric water content is calculated from the gravimetric moisture content and the material's dry density. Thermal conductivity values for the ice-rich silt were calculated using a geometric mean approach, using Kersten's charts and the thermal conductivity of ice. The heat capacity of the ice-rich silt also was calculated using a geometric mean approach, using the appropriate proportions of saturated silt or visible ice in the calculation.

Because of a lack of Noatak climate data, the air temperature data from Kotzebue were used as a boundary condition and applied to the ground surface in the model. The surface temperature, however, can vary greatly from the air temperature, and surface temperature data is rarely collected. To simulate surface temperatures, we imposed an n-factor function within the surface boundary condition to simulate snow cover and higher surface temperatures on gravel and/or asphalt in the summer months. It was assumed that the

Table 1: Material properties used in thermal modeling

Material	Dry density (lb/ft³)	Thermal conductivity (Btu/hr*ft*°F)		Heat capacity (Btu/ft³*°F)		Gravimetric moisture content (%)	Volumetric water content (%)
		Unfrozen	Frozen	Unfrozen	Frozen		
Sandy gravel (optimum moisture content)	135	1.2	1.4	31.2	27.8	5.0	10.9
Organic mat (dry on surface)	---	0.2	0.4	25.3	23.8	---	4.0
Asphalt	125	1.2	1.2	33.0	33.0	~1.0	~2.0
Foundation soils	80	0.5	1.1	69.1	43.5	105.7	75.0

snow on the embankment surface would be removed during the winter months, and pushed to the sides of the embankment, thereby increasing the snow cover on the side slopes of the embankment. It was assumed that the organic mat was not disturbed immediately adjacent to the embankment. N-factors simulating undisturbed natural ground cover were applied beyond that point. The n-factors listed in Table 2 are commonly used values for the materials and conditions given.

Table 2: Summary of n-factors

Material	n-Factor	
	Freezing	Thawing
Bare gravel	1.0	1.5
Gravel covered with snow	0.6	1.5
Undisturbed natural cover	0.3	0.7
Asphalt	0.9	1.8

A constant heat flux boundary condition was imposed on the nodes at the bottom of the model. This heat flux (0.01 Btu/ft^2*hr) simulates that due to the geothermal gradient through frozen silt. This is a more realistic boundary condition than applying a constant temperature boundary condition (D. Goering, personal communication, March 2007). All nodes in the foundation soils were given an initial temperature condition of –1.1°C (30 °F), and all nodes in the embankment were given an initial temperature condition of -4°C (~25 °F) as an arbitrary value for January. The model was run for 10 years, with the temperature results saved every 5 days after the first 5 years. The model stabilized within the first 5 years.

For this thermal modeling, it was assumed that no thaw settlement took place. The runway embankment was modeled using a 150-ft wide surface. Several different

configurations were modeled, using a variety of heights, foreslopes, and insulation placements. Each of these configurations incorporated the full-width of the embankment from centerline (i.e., 75 ft). Figure 1 is an example of the 8-ft high embankment model, shown in blue. The organic mat is shown in magenta, the foundation soils are shown in green, and a boundary condition imposed at a node is indicated by a red dot, or blue triangles for the heat flux condition. The following is a list of the model configurations:

- 14-ft high, 4:1 foreslope, no insulation
- 12-ft high, 4:1 foreslope, no insulation
- 10-ft high, 4:1 foreslope, no insulation
- 10-ft high, 2:1 foreslope, no insulation
- 8-ft high, 4:1 foreslope, no insulation
- 8-ft high, 2:1 foreslope, no insulation
- 8-ft high, 2:1 foreslope, 4 in. insulation at ground surface
- 8-ft high, 2:1 foreslope, 4 in. insulation at 2 ft above ground surface
- 8-ft high, 2:1 foreslope, 4 in. insulation at 2 ft above ground surface and additional 5-ft wide layer at toe of slope.
- 8-ft high, 2:1 foreslope, 4 in. insulation at 2 ft above ground surface, 2 in. asphalt surfacing.

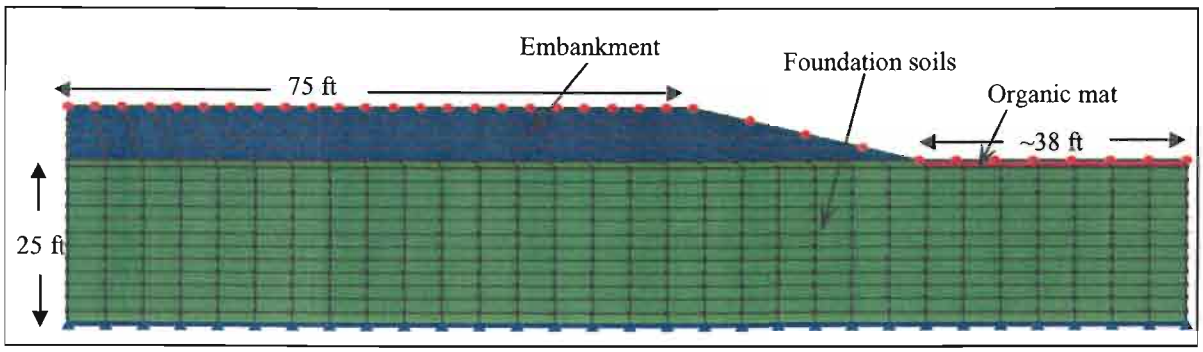


Figure 1: Example of mesh used to simulate the embankment and foundation soils. The embankment is shown in blue, the foundation soils with 50% visible ice are shown in dark green, and the organic mat is shown in magenta. The air temperature boundary condition with n-factor modifying function is shown as a red dot, and the geothermal heat flux boundary condition is shown as a blue triangle. Individual elements are indicated by the grid pattern.

Results

The thaw depths for all of the thermal equilibrium models, assuming no thaw settlement, are summarized in Table 3, and the results are shown in Figures 2 through 11. Each figure shows the model results around September 15th, which is the time of deepest thaw. Thaw depths were determined graphically from these model results within the TEMP/W program. Temperature isotherms are indicated by color contours. The contour interval is the same in every figure (i.e., 1°C), although the actual colors may vary slightly from figure to figure. No scale is provided in these figures because of the suspected distortion created when importing the figures into the electronic document. Thus, the graphical

Table 3: Summary of thermal equilibrium model results. Depths given are relative to original ground.

Embankment Configuration	Point of Thermal Equilibrium	
	Below Centerline (ft)	Below Toe (ft)
14-ft high, 4:1, no insulation	0.0	-4.8
12-ft high, 4:1, no insulation	-0.7	-4.7
10-ft high, 4:1, no insulation	-1.2	-4.9
10-ft high, 2:1, no insulation	-1.2	-4.6
8-ft high, 4:1, no insulation	-2.3	-4.9
8-ft high, 2:1, no insulation	-2.3	-4.6
8-ft high, 2:1, 4 in. insulation at ground surface	0.0	-4.6
8-ft high, 2:1, 4 in. insulation at 2 ft	**+2.0**	-4.6
8-ft high, 2:1, 4 in. ins. at 2 ft and at toe	**+2.0**	-4.6
8-ft high, 2:1, 4 in. insulation at 2 ft, 2 in. asphalt	-0.1	-4.6

results presented are to be used as a visual means of comparison only, and not for precise measurements. The material boundaries are indicated by the heavy black lines, which can be used for a relative scale. The model results indicate that the active layer is about 3-ft deep, and remains at this depth throughout the 10 years of the model, indicating an established thermal equilibrium with the given parameters. The model-derived active layer depth may be deeper than the actual active layer. This statement is based on modeling results in other Arctic areas. Unfortunately, because of the time of year of drilling, the actual depth for the given conditions and location can not be established.

For the Noatak area, the model results indicate that the 2:1 foreslope configuration is slightly more preferable to the 4:1 foreslope, as the 4:1 foreslope causes deeper thaw under the foreslope and toe. A 14-ft high embankment limits the depth of thaw to the original ground surface below the center portion of the embankment. An 8-ft high embankment with 4 in. insulation also limits the depth of thaw to the elevation of the insulation. For example, if the insulation is placed at the ground surface, the model results indicate that the foundation soils immediately below the insulation remain frozen. If the insulation is placed 2 ft up from original ground within the embankment, the lower 2 ft of the embankment freezes within the first 10 years after construction.

The thaw bulb below the toe of the embankment is more problematic. All configurations modeled indicate that the depth of thaw is about 4.5 ft to 5 ft immediately below the toe of slope. The model results suggest that adding multiple layers of insulation near the toe widens the thaw bulb, pushing it farther under the structural embankment. Based on this analysis, expect longitudinal cracking along the embankment side slopes, the development of thaw ponds along the toe, and general settlement of the side slopes. Consider the placement of thermal berms to move this thawing away from the structural embankment.

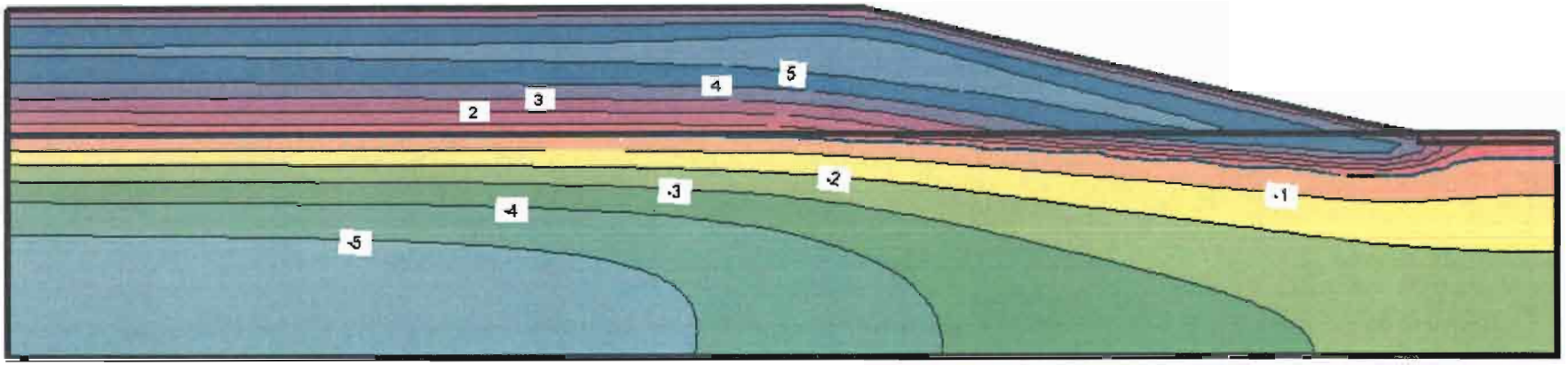


Figure 2: Model results with a 14-ft high embankment, no insulation, and 4:1 foreslope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

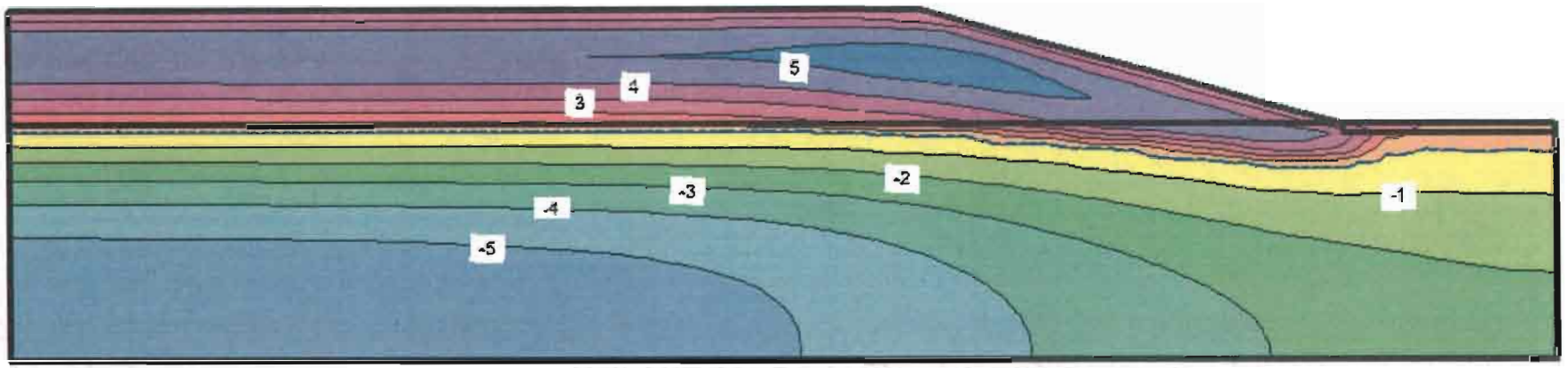


Figure 3: Model results with a 12-ft high embankment, no insulation, and 4:1 foreslope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

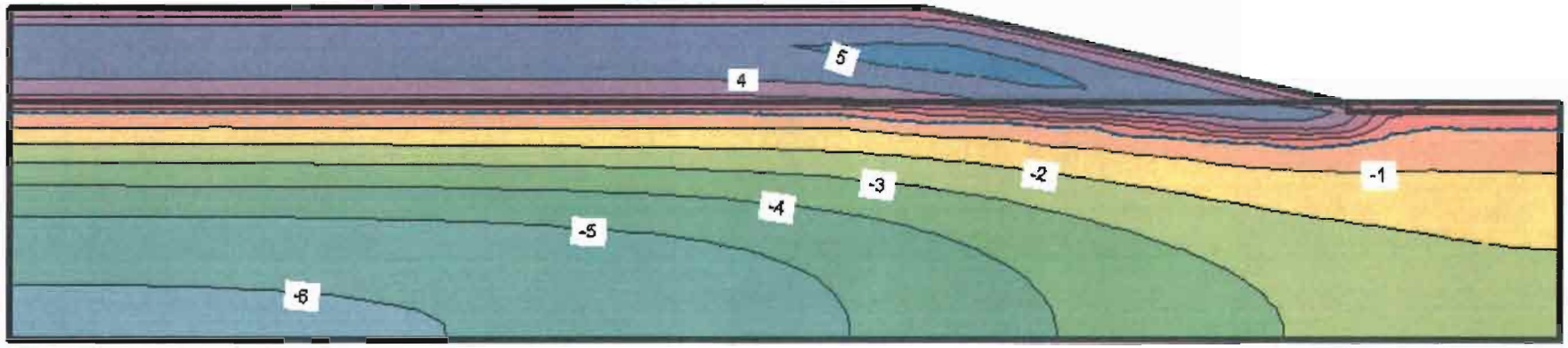


Figure 4: Model results with a 10-ft high embankment, no insulation, and 4:1 foreslope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

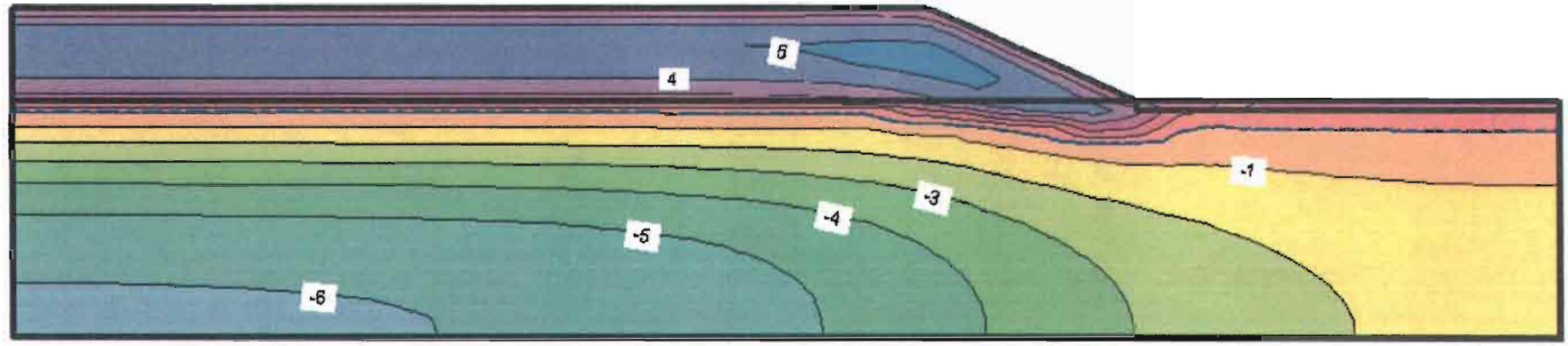


Figure 5: Model results with a 10-ft high embankment, no insulation, and 2:1 foreslope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

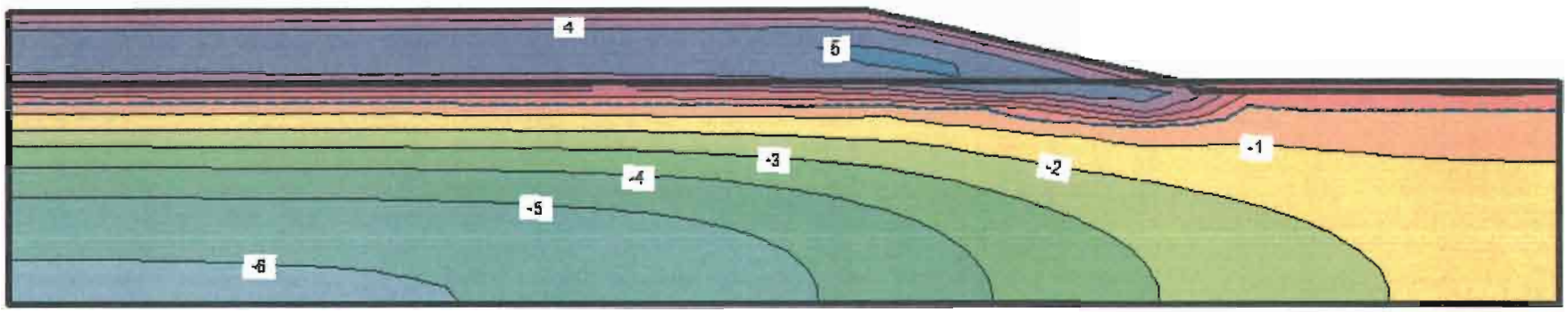


Figure 6: Model results with an 8-ft high embankment, no insulation, and 4:1 foreslope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

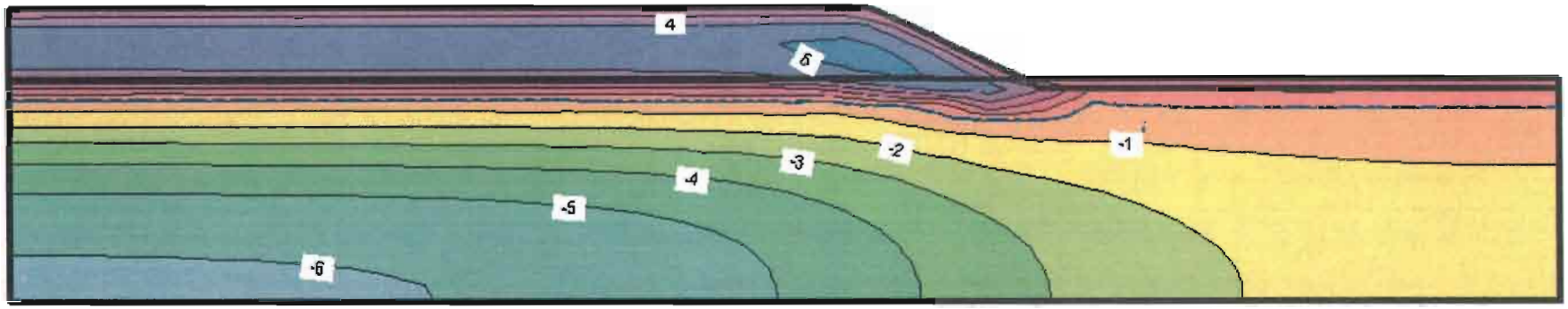


Figure 7: Model results with an 8-ft high embankment, no insulation, and 2:1 foreslope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

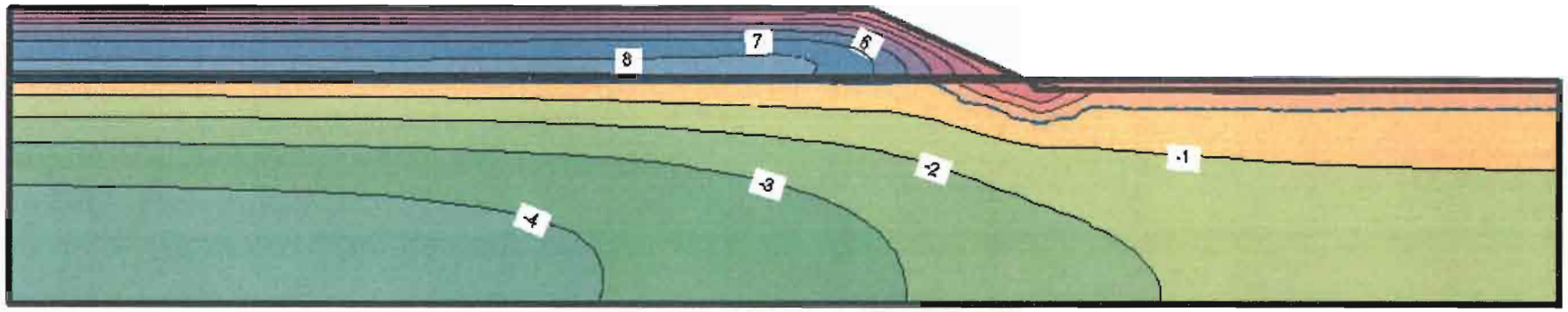


Figure 8: Model results with an 8-ft high embankment, 2:1 foreslope, and 4 in. insulation placed at the ground surface. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

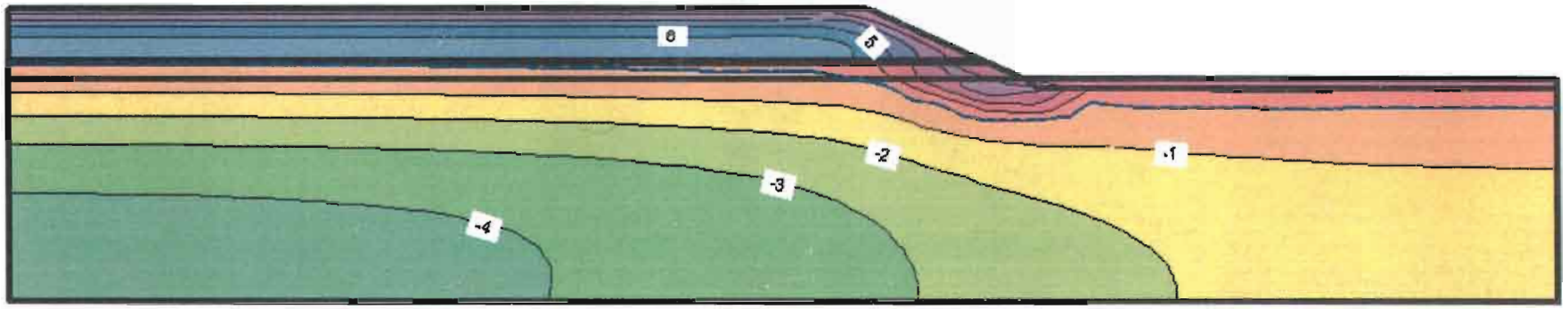


Figure 9: Model results with an 8-ft high embankment, 2:1 foreslope, and 4 in. insulation placed at 2 ft up from the ground surface. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

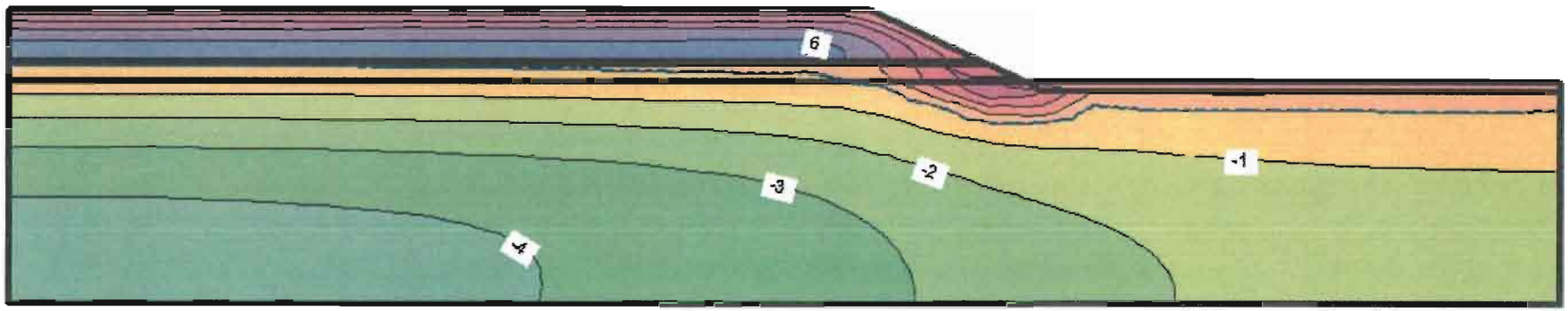


Figure 10: Model results with an 8-ft high embankment, 2:1 foreslope, and 4 in. insulation placed at 2 ft up from the ground surface, and an additional 5-ft wide layer placed on the ground surface at the toe of the slope. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

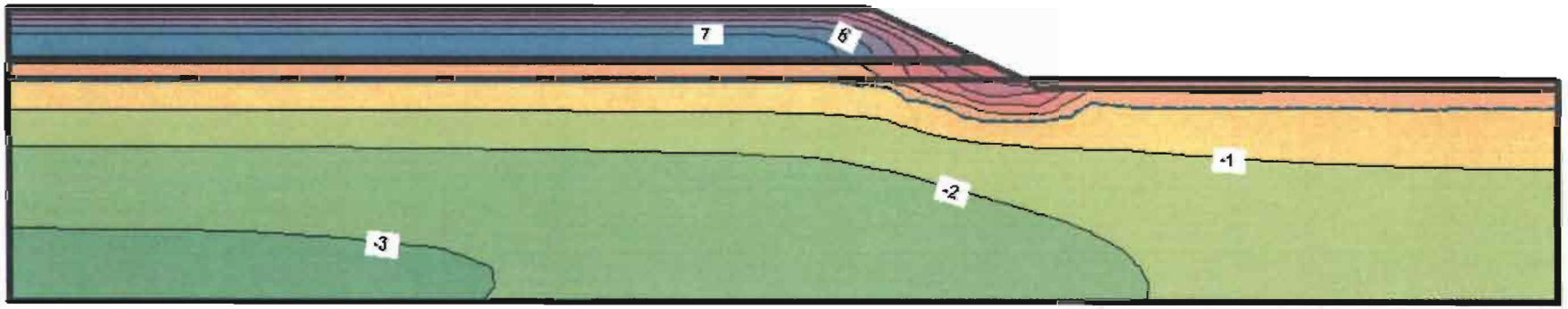
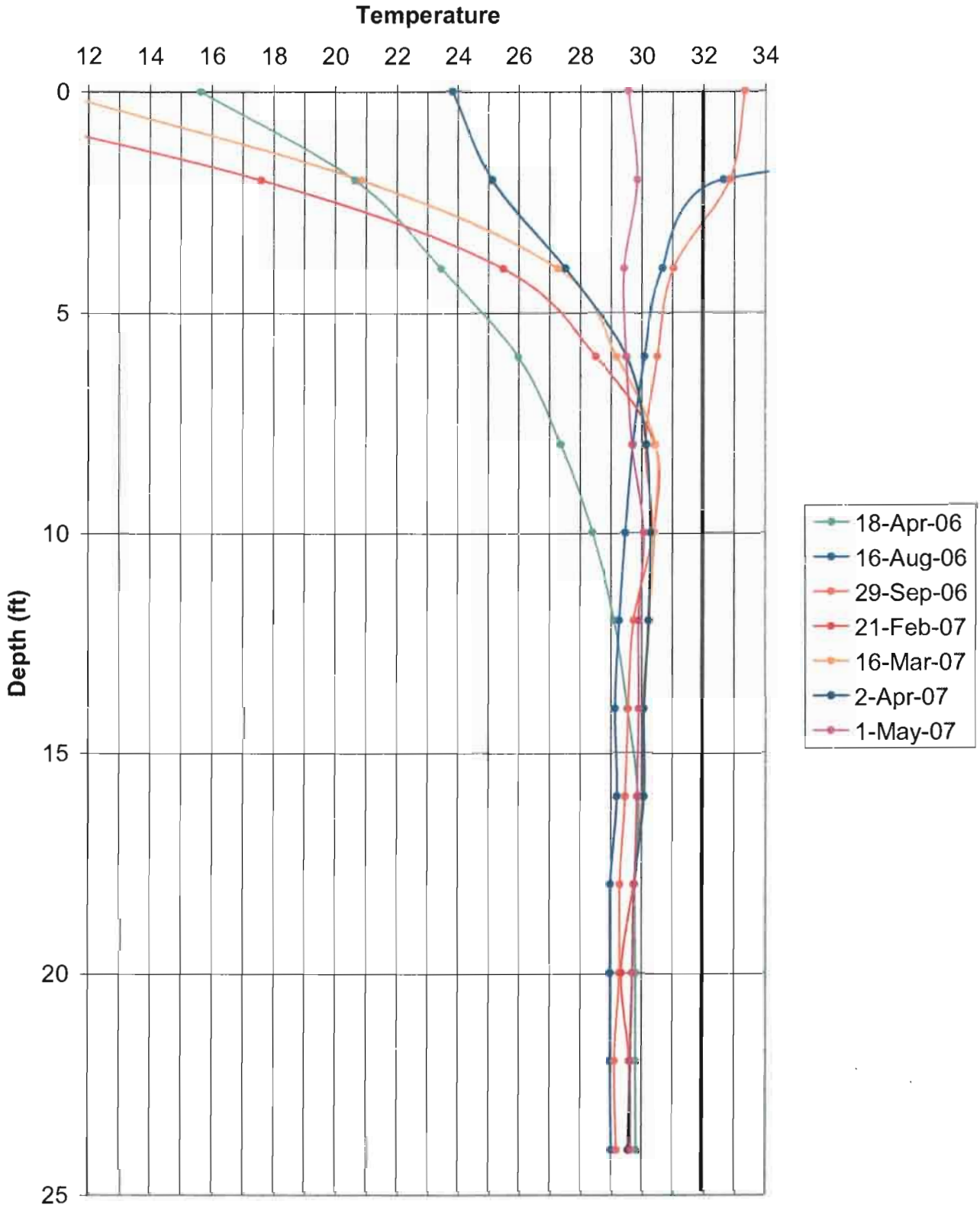


Figure 11: Model results with an 8-ft high embankment, 2:1 foreslope, 4 in. insulation placed at 2 ft up from the ground surface, and 2 in. asphalt surfacing applied at the embankment surface. Temperatures in °C are color-contoured using a 1°C contour interval, and the 0°C isotherm is shown as a blue, dashed line. Material boundaries are indicated by dark black lines.

Noatak ground temperatures

TH 06-41, proposed runway (drilled April 1, 2006)



Appendix F

Gravel bar material site

Gravel bar material site

The Material Site information is included for the purpose of assisting in the project design process. It does not signify that the source is available or suitable for use during the construction of any current or future project. This Geotechnical Report does not determine source availability or suitability for any construction project; it only provides information that can be used to make that determination during the project design process. Sources available or suitable for use for a construction project will be specified in the appropriate section of the Plans and Specifications of the Contract Documents for the construction project.

Location and access

The preferred material site lies about 2 miles southeast of the project on the Noatak River. It is located in the Kateel River Meridian, T 25 N, R 19 W, Section 32. There is no access road to the site.

Description

This site consists of 100+ acres of gravel and sand in the active floodplain of the Noatak River. NRMS personnel explored the site with 24 auger test holes to depths of 10 to 18 feet. Soils consisted of interbedded gravel and sand, predominantly fine gravel and coarse sand. No cobbles (3-inch plus) or boulders were observed. While much of the gravel was 2-inch minus or finer, some pockets of coarser gravel were present. Classifications ranged from poorly- to well-graded gravel with sand to poorly-graded sand with gravel (GP, GW, and SP). Samples were clean with few fines due to washing by river water. P200 values ranged from 0.4 to 3.1%.

Sandy silt to silty sand was observed in the upper 3 to 4 feet of two test holes, 06-23 and 06-24. These test holes were located at the southwest end of the gravel bar in a low area. Also, soils below the water table typically contained fine sand where as fine sand was generally absent in soils above the water table.

Note that gravel bars on the Noatak can shift, erode or aggrade on a large scale from year to year. The present configuration of this gravel bar could change before the project construction date: the site should be reevaluated before the contract is put out for bid.

Land status and usage

The site is currently owned by the State of Alaska, and administered by the Department of Natural Resource (DNR). Note that ownership could change to native corporation if the site becomes vegetated. The site is undeveloped. Land between the material site and the project or the village may include native allotments or Native corporation land. All appropriate and applicable permits must be obtained for this site prior to use, and the site should be surveyed.

Clearing and stripping

The site is mostly unvegetated with some areas of willow and grasses. There was no overburden.

Water table

In late March 2006, the water table was intercepted at depths of 8 to 11 feet. The water table corresponds to the river level. The river level is significantly higher during break up or rainy periods – the gravel bar or portions may be underwater at some times of the year.

Frozen ground

We did not encounter permafrost conditions in any of the test holes within the depth drilled. Seasonal frost was present from the ground surface to depths of 4 to 8 feet. Frozen soils we drilled were not strongly bonded and were dry to moist (well-drained) above the water table.

Quality of material

Laboratory test	Test results
Degradation factor	82, 84, 84
L. A. Abrasion %loss	22, 22, 24
Sodium sulfate soundness, coarse Sodium sulfate soundness, fine	0.2, 0.2, 0.5 0.4, 0.6, 0.8
Modified Proctor moisture–density relationship	Max. density 137.1 pcf at 5% optimum moisture (one sample only)
Specific gravity, coarse Specific gravity, fine	2.67 2.69

The material meets the specifications for crushed aggregate base course in terms of L.A. Abrasion, degradation, and sodium sulfate values. The practical limitations for the material are the lack of fines in terms of compactibility and the small size of gravel as far as providing crushing stock.

Some silt was present at the southwest end of the gravel bar. Another option is to mine silt from the eroding cutbank near the gravel bar, though the organic content makes this option less desirable.

Noatak Airport Relocation
Material Site on Noatak River

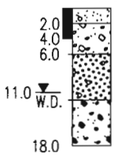
LEGEND

Test hole location

0 1,000 2,000 Feet

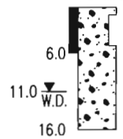
N
W E
S

06-01
N67.53266', W162.99282'
25 MAR



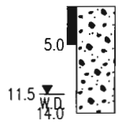
	06-01
0.0- 2.0	Bn-GyPoorly-graded SAND w/ Gravel
2.0- 6.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
6.0-12.0	Bn-Gy Well-graded SAND w/ Gravel
12.0-18.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-02
N67.53194', W162.99059'
25 MAR



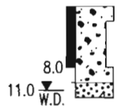
	06-02
0.0- 16.0	Bn-Gy Well-graded GRAVEL w/ Sand SAMPLE 06-6000 (1.0-5.0) GW, 0.9% -200

06-03
N67.53172', W162.99341'
25 MAR



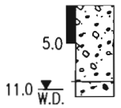
	06-03
0.0- 14.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-04
N67.53053', W162.99169'
25 MAR



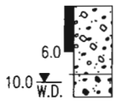
	06-04
0.0- 10.0	Bn-Gy Well-graded GRAVEL w/ Sand SAMPLE 06-6001 (2.0-8.0) GW, 0.7% -200
10.0-12.0	Bn-Gy Well-graded SAND w/ Gravel

06-05
N67.52894', W162.99027'
25 MAR



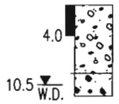
	06-05
0.0- 10.0	Bn-Gy Poorly-graded GRAVEL w/ Sond
10.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-06
N67.52828', W162.99322'
25 MAR



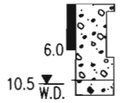
	06-06
0.0- 9.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
9.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-07
N67.52933', W162.99538'
26 MAR



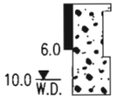
	06-07
0.0- 9.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
9.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-08
W67.53070', W162.99728'
26 MAR



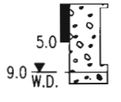
	06-08
0.0-10.0	Bn-Gy Poorly-graded GRAVEL w/ Sand SAMPLE 06-6002 (1.0-7.0) GP, 0.8% -200
10.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-09
N67.52998', W163.00138'
26 MAR



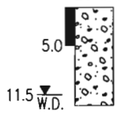
	06-09
0.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sond SAMPLE 06-6004 (1.0-7.0) GW, 0.6% -200

06-10
N67.53843', W162.99899'
26 MAR



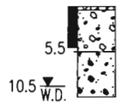
	06-10
0.0- 9.0	Bn-Gy Poorly-groded GRAVEL SAMPLE 06-6003 (0.5-8.0) GP, 0.4% -200 SSc 0.2, SSf 0.4 LA 24, DEG 84
9.0-10.5	Bn Well-graded GRAVEL w/ Sand

06-11
N67.52662', W162.99741'
26 MAR



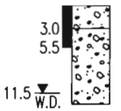
	06-11
0.0-13.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-12
N67.52607', W162.99467'
26 MAR



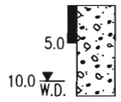
	06-12
0.0- 0.5	Bn SILT Org
0.5- 6.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
6.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-13
N67.52522', W162.99888'
27 MAR



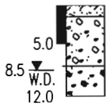
	06-13
0.0- 3.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
3.0-13.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-14
N67.52441', W162.99871'
27 MAR



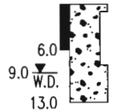
	06-14
0.0-12.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-15
N67.52535', W163.00235'
27 MAR



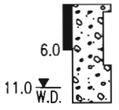
	06-15
0.0- 1.5	Bn Silty SAND, dry, sl Org
1.5- 8.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
8.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-16
N67.52643', W163.00186'
27 MAR



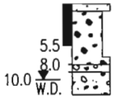
	06-16
0.0-13.0	Bn-Gy Well-graded GRAVEL w/ Sand SAMPLE 06-6005 (1.0-8.0) GW, 0.9% -200 SSc 0.2, SSf 0.6 LA 22, DEG 84

06-17
N67.52786', W163.00126'
27 MAR



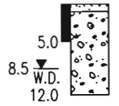
	06-17
0.0-13.0	Bn-Gy Poorly-graded GRAVEL w/ Sand SAMPLE 06-6006 (1.0-8.0) GP, 2.1% -200

06-18
N67.52854', W163.00438'
28 MAR



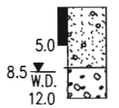
	06-18
0.0- 1.0	Bn Poorly-graded SAND w/ Gravel
1.0- 8.0	Bn-Gy Well-graded GRAVEL SAMPLE 06-6007 (1.0-7.0) GW, 2.1% -200 SSc 0.5, SSf 0.8 LA 22, DEG 82
8.0- 9.0	Bn-Gy Poorly-graded GRAVEL w/ Sand
9.0-12.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-19
N67.52742', W163.00600'
28 MAR



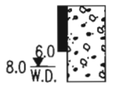
	06-19
0.0-1.0	Bn-Gy Poorly-graded SAND
1.0-12.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-20
N67.52759', W163.00888'
28 MAR



	06-20
0.0- 8.0	Bn-Gy Poorly-graded SAND w/ Gravel
8.0-12.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-21
N67.52641', W163.00837'
28 MAR

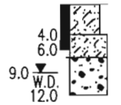


	06-21
0.0-10.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

06-22
N67.52545', W163.00678'
28 MAR

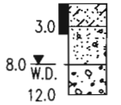
	06-22
0.0- 1.0	Bn-Gy Poorly-graded SAND
1.0-11.0	Bn-Gy Poorly-graded GRAVEL w/ Sand SAMPLE 06-6008 (1.0-7.0) GP, 3.1% -200

06-23
N67.52453', W163.00356'
28 MAR



	06-23
0.0- 4.0	Bn-Gy Sandy SILT SAMPLE 06-6009 (0.0-4.0) ML, 68.5% -200
4.0- 7.0	Bn-Gy Poorly-graded SAND w/ Silt
7.0-12.0	Bn-Gy Well-graded GRAVEL w/ Sand

06-24
N67.52345', W163.00579'
28 MAR



	06-24
0.0- 3.0	Bn-Gy Silty SAND
3.0- 8.0	Bn-Gy Poorly-groded SAND w/ Gravel
8.0-12.0	Bn-Gy Poorly-graded GRAVEL w/ Sand

W.D. - WHILE DRILLING
A.D. - AFTER DRILLING

Vert. 10 feet 0

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
ENGINEERING GEOLOGY UNIT

DATA: JR	NOATAK AIRPORT RELOCATION MATERIAL SITE TESTHOLES
DRAWN: CP	
APPROVED: SM	PROJ. NO.: AKS 61478
DATE: DECEMBER 2007	I:\Geo\61478 Noatak\Testholes-06-1

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: PROPOSED RIVER GRAVEL BAR

TEST HOLE NUMBER		06-02	06-04	06-08	06-10	06-09	06-16	06-17
DEPTH (feet)		1-5	2-8	1-7	0.5-8	1-7	1-8	1-8
LATITUDE		N67.53194	N67.53052	N67.5307	N67.52843	N67.52998	N67.52643	N67.52786
LONGITUDE		W162.99059	W162.99169	W162.99728	W162.99899	W163.00138	W163.00186	W163.00126
LAB NUMBER		06-6000	06-6001	06-6002	06-6003	06-6004	06-6005	06-6006
DATE SAMPLED		25-Mar-06	25-Mar-06	26-Mar-06	26-Mar-06	26-Mar-06	27-Mar-06	27-Mar-06
% Passing	**3"**	100						
	2"	98		100			100	
	1.5"	97	100	99	100	100	98	100
Gravel	**1.0"**	86	92	88	91	98	92	99
	0.75"	71	76	74	79	94	83	95
	0.5"	50	52	49	54	80	65	83
	0.375"	40	39	34	38	69	54	72
	#4	21	19	9	10	39	30	39
	#8	11	12	4	3	24	18	24
	#10	9	11	3	3	23	17	22
	#16	6	9	3	2	18	13	17
	#30	5	7	2	2	14	9	13
Sand	**#40**	4	6	2	1	10	7	10
	#50	3	3	2	1	5	4	7
	#60	2	2	1	1	3	3	6
	#80	2	1	1	1	2	2	4
	#100	1	1	1	1	1	1	4
Silt/Clay	**#200**	0.9	0.7	0.8	0.4	0.6	0.9	2.1
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV	NV	NV	NV	NV	NV
PLASTIC INDEX		NP	NP	NP	NP	NP	NP	NP
USCS CLASSIFICATION		GW	GW	GP	GP	GW	GW	GP
AK DOT SOIL DESCR.								
NATURAL MOISTURE								
ORGANICS								
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION					24		22	
DEGRAD. FACTOR					84		84	
SODIUM SULF. (CRSE)					0.2		0.2	
SODIUM SULF. (FINE)					0.4		0.6	
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: PROPOSED RIVER GRAVEL BAR

TEST HOLE NUMBER		06-18	06-22	06-23				
DEPTH (feet)		1-7	1-7	0-4				
LATITUDE		N67.52854	N67.52545	N67.52453				
LONGITUDE		W163.00438	W163.00678	W163.00356				
LAB NUMBER		06-6007	06-6008	06-6009				
DATE SAMPLED		28-Mar-06	28-Mar-06	28-Mar-06				
% Passing	**3"**							
	2"	100						
	1.5"	99	100					
	1.0"	88	98					
Gravel	**0.75"**	78	92					
	0.5"	55	74					
	0.375"	41	62					
	#4	16	36					
	#8	8	26					
	#10	8	25					
	#16	6	23					
	#30	6	21	100				
Sand	**#40**	5	18	99				
	#50	5	14	98				
	#60	4	12	98				
	#80	3	8	93				
	#100	3	6	87				
Silt/Clay	**#200**	2.1	3.1	68.5				
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV	NV				
PLASTIC INDEX		NP	NP	NP				
USCS CLASSIFICATION		GW	GP	ML				
AK DOT SOIL DESCR.								
NATURAL MOISTURE								
ORGANICS								
SP. GR. (FINE)			2.69					
SP. GR. (COARSE)			2.67					
MAX. DRY DENSITY			137.1					
OPTIMUM MOISTURE			5.0					
L.A. ABRASION		22						
DEGRAD. FACTOR		82						
SODIUM SULF. (CRSE)		0.5						
SODIUM SULF. (FINE)		0.8						
REMARKS								
GENERAL COMMENTS		Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.						

State of Alaska Dept. of Transportation Northern Region Materials Lab.

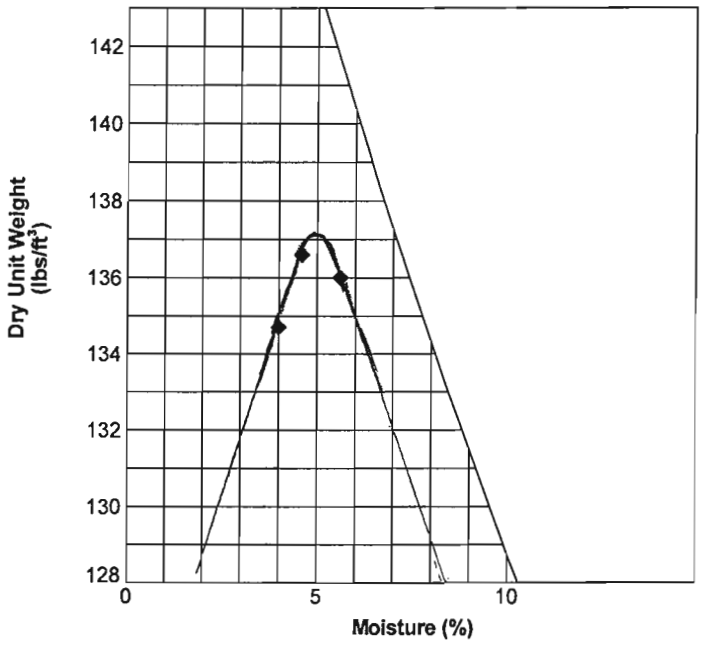
COMPACTION REPORT

Lab Number: **06-6008**

Project: NOATAK AIRPORT RELOCATION *Field Number:*

Source:

MOISTURE / DENSITY RELATIONSHIP



NOTE: The upper right portion of the graph may be clipped at the ZAV.

Dry Unit Wt	1	2	3	4	5	6
lbs/ft³	134.7	136.6	136.0			
kg/m³	2158	2188	2179			
% Moisture	4.0	4.6	5.6			

REMARKS:

ASTM D-1557 AASHTO T-180D	*Regional Lab.*		*Field*
	lbs/ft³	*kg/m³*	
Max. Density	137.1		
Opt. Moisture	5.0		

Acceptance/Assurance Comparison

Acceptable | Unacceptable

Signature: _____

Materials Engineer / Designee

Date: _____

Signature: T-L

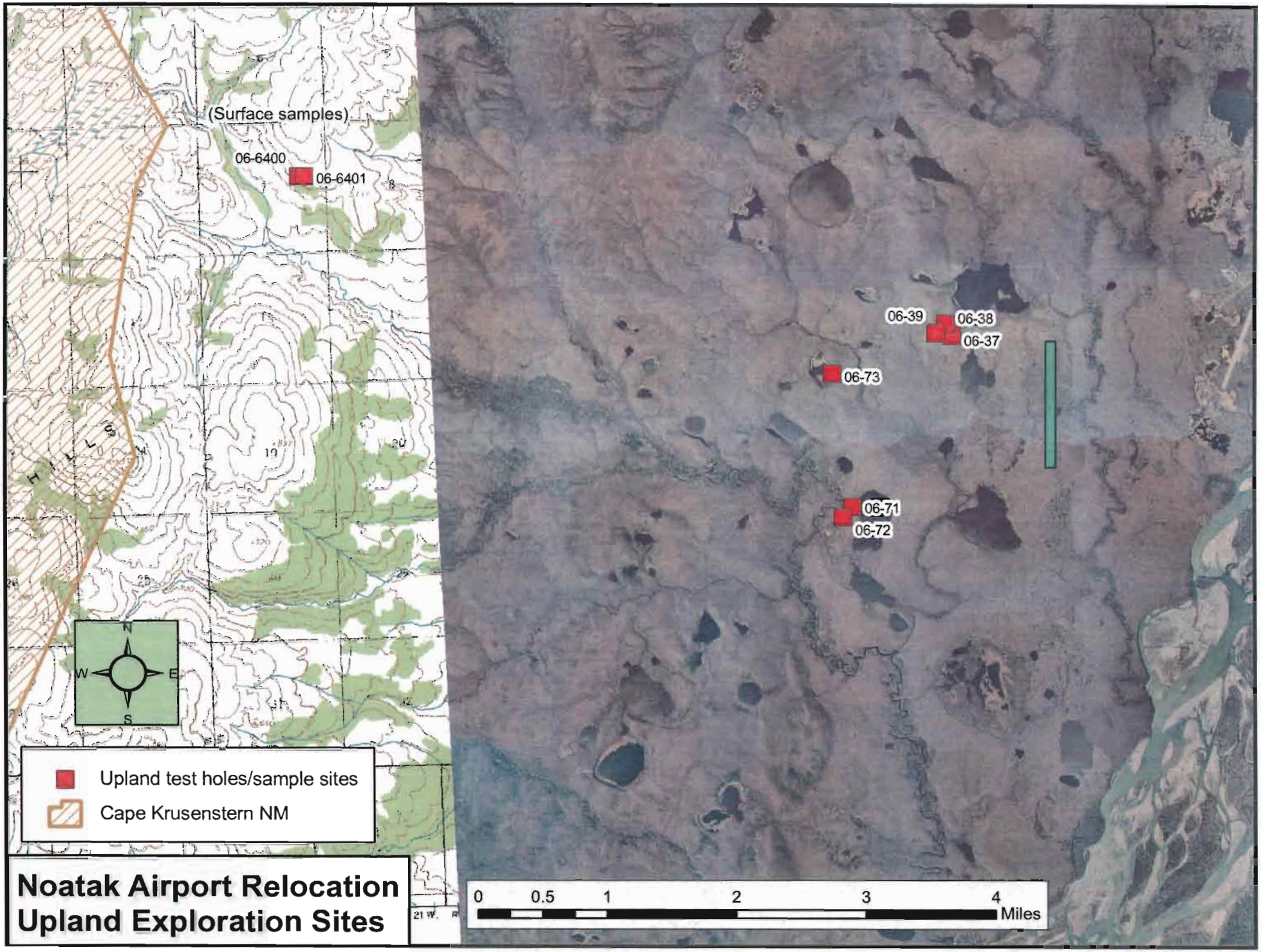
Tonya Knopke

Regional Lab Supervisor

Date: 10/17/06

Appendix G

Upland exploration sites



Noatak Airport Relocation
Upland Exploration Sites

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-37
Project Number	AKSAS 61478	Total Depth	22 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56213, W163.06421
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Upland MS recon

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							Bn-Gy SILT
	2							*Org*, Vs
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							ICE
	16							
	17							
	18							
	19							
	20							
	21							
	22							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-38
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Blowing snow, 20-28 deg F, 10 mph wind, NNE
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56343, W163.0659
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Upland MS recon

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT Vr
	1								Bn SILT *hi Org*, Vs
	2								
	3								
	4								Bn SILT *Org*, Nbe, to Vs
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								Gy SILT Nbe
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-39
Project Number	AKSAS 61478	Total Depth	22.5 feet
		Dates Drilled	3/31/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	P. cloudy, 28 deg F, 20 mph wind, SWW
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 1.5 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.56245, W163.06871
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Upland MS recon

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0								ORG MAT Vr Bn SILT *Org*, Vs
	15								Gy SILT *sl Org*, Nbe
	22								BOH

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-71
Project Number	AKSAS 61478	Total Depth	21 feet
		Dates Drilled	4/11/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Snow, 20 deg F, light S wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54324, W163.09452
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
MS recon, flats near creek mouth

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count		N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL	Depth in (Feet)
S-S Auger	0								PEAT w/ Silt Vs	0
	1									1
	2									2
	3									3
	4								Bn-Gy SILT *Org*, Vs	4
	5									5
	6									6
	7									7
	8									8
	9									9
	10									10
	11									11
	12									12
	13									13
	14									14
	15									15
	16									16
	17									17
	18									18
	19									19
	20									20
	21								Gy Sandy SILT w/ Gravel BOH	21

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-72
Project Number	AKSAS 61478	Total Depth	20 feet
		Dates Drilled	4/11/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Snow, 20 deg F, light S wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.54213, W163.09737
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
MS recon, flats near creek mouth

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | N-Value | Frozen | Graphic Log

Depth (ft)	SUBSURFACE MATERIAL
0	PEAT w/ Silt Vs
3	Gy-Bn SILT *Org*, Vs
13	PEAT w/ Silt Vs, (10 ft plug on lower augers)
20	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	NOATAK AIRPORT RELOCATION	Test Hole Number	06-73
Project Number	AKSAS 61478	Total Depth	25 feet
		Dates Drilled	4/11/2006
Field Geologist	J. ROWLAND	Equipment Type	CME 45B
Field Crew	S. PARKER, J. CLINE	Weather	Snow, 20 deg F, light S wind
TH Finalized By	J. ROWLAND	Vegetation	Treeless tundra, 2-3 ft snow cover
		Station, Offset	
		Latitude, Longitude	N67.5582, W163.09926
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
Upland MS recon

Drilling Method	Depth in (Feet)	Sample Data: Method	Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0							ORG MAT
	1							SILT
	2							*hi Org*, Vs
	3							Bn SILT
	4							*Org*, Vs
	5							
	6							
	7							
	8							Gy SILT
	9							*sl Org*, Vs
	10							
	11							
	12							
	13							
	14							
	15							Bn SILT
	16							Nbe
	17							
	18							ICE
	19							
	20							
	21							
	22							
	23							
	24							Bn SILT
	25							BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☒ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS NOATAK.GPJ NR_AKDOT_PRECON_USCS_01_23_06.GDT 1/29/07

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: NOATAK AIRPORT RELOCATION
PROJECT NUMBER:
AKSAS NUMBER: 61478
SAMPLED BY: J. ROWLAND
MATERIAL SOURCE: UPLAND SITE

TEST HOLE NUMBER		06-6400	06-6401					
DEPTH (feet)		0-	0-					
LATITUDE		N67.58206	N67.58207					
LONGITUDE		W163.25182	W163.25338					
LAB NUMBER			06-6401					
DATE SAMPLED		17-Aug-06	17-Aug-06					
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8							
	#10							
	#16							
	#30							
Sand	**#40**							
	#50							
	#60							
	#80							
	#100							
Silt/Clay	**#200**							
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT								
PLASTIC INDEX								
USCS CLASSIFICATION								
AK DOT SOIL DESCR.								
NATURAL MOISTURE								
ORGANICS								
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION		25	18					
DEGRAD. FACTOR		23	77					
SODIUM SULF. (CRSE)		2.9	0.3					
SODIUM SULF. (FINE)		0.0	0.0					
REMARKS								

GENERAL COMMENTS Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.